CANADA

Report by

THE TARIFF BOARD

Pursuant to the Inquiry Ordered
by the Minister of Finance
respecting

COMPUTERS AND RELATED TELECOMMUNICATIONS EQUIPMENT

Reference No. 150

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The Honourable Donald Macdonald, M.P., P.C.
Minister of Finance
Ottawa

Dear Mr. Macdonald:

I refer to the Honourable E.J. Benson's letter of December 10, 1971, addressed to Mr. L.C. Audette, Q.C., former Chairman of the Tariff Board, directing the Tariff Board to make a study and report on the effect of the Customs Tariff on the production and use of computers and related telecommunications equipment in Canada.

I now have the honour to transmit the Report of the Board in English and in French, signed by them on March 3, 1977. A copy of the transcript of the proceedings at the public sittings accompanies this Report.

Yours sincerely

Pamela A. McDougall

Chairman

Explanation of Symbols Used

- \- Denotes zero or none reported
- .. Indicates that figures are not available
- * Indicates a reported figure which disappears on rounding, or is negligible

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The sum of the figures in a table may differ from the total, owing to rounding.

The record of the proceedings of the public sittings held by the Board on this Reference is referred to as the Transcript.

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LETTER OF REFERENCE

Ottawa, Ontario,
K1A 0G5
December 10, 1971.

Mr. L. C. Audette, Q.C.,
Chairman,
The Tariff Board,
219 Argyle Avenue,
Ottawa, Ontario.
K1A 0G7

Dear Mr. Audette:

I have received representations concerning the effect of the Customs Tariff on the production and use of computers and related telecommunications equipment in Canada. One suggestion which has been made is that a consolidated tariff schedule for data processing and related telecommunications equipment would encourage the development and growth of production facilities for this equipment in Canada. It has also been alleged that the duty on such equipment, especially that which is not available in Canada, is having an adverse effect on the ability of the Canadian business community to take advantage of computer services and techniques and discourages the processing of data in Canada.

Having in mind the interests of both manufacturers and users of data processing and related telecommunications equipment, it appears desirable that the Tariff Board make a study and report under section 4(2) of the Tariff Board Act on the following items insofar as they relate to such equipment and parts thereof:

41202-1	41425-1	44508-1	44539-1
41400-1	41430-1	44524-1	44546-1
41405-1	41435-1	44532-1	46200-1
41415-1	42700-1	44533-1	46241-1
41420-1	44506-1	44538-1	

The Board should also include in its study any other tariff items which it feels are relevant to the review.

If, in the Board's judgement, admendments to the Customs Tariff would be desirable, I would request the Board to include in its report recommendations regarding such amendments.

Yours sincerely,

E. J. Benson,
Minister of Finance.

INTRODUCTION

INTRODUCTION

Experimental computers first appeared during the Second World War, but production models have been commercially available only for the last 15 or 20 years. During this short time-span, the computer industry has been characterized by very high rates of growth. It has now attained a size and depth in which many thousands of persons throughout the industrialized nations are engaged in the research, production and marketing of computing equipment. Many times their number are employed in using computers on an immense variety of tasks. In many areas of social and economic endeavour, computers have become virtually indispensible and continue to increase in application.

Almost from the start the areas of research, production and marketing have been dominated by a few large multinational enterprises based in the United States and with a presence in almost all national markets. In Canada, most computing equipment is produced by subsidiaries of these multinationals. Their output is very largely for export, while most of the equipment used in Canada is imported. The Canadian role in the industry has tended to be more heavily weighted towards the use of computing equipment than to its manufacture.

SCOPE OF THE REFERENCE

In his letter of reference the Minister of Finance specifically requests the Tariff Board to make a study and report under section 4(2) of the Tariff Board Act on 19 tariff items with respect to computers and related telecommunications equipment. Table 3.1 of Chapter III lists the tariff items specifically referred to the Board, together with their nomenclatures and rates of duty. In addition, the Board is directed to include in its study, any other tariff items which it feels are relevant.

The Board is expected to consider the interests of both manufacturers and users of data processing and related telecommunications equipment, and is directed to include in its report any amendments to the Customs Tariff that it considers desirable.

The Minister of Finance instructs the Board to consider computers and related telecommunications equipment; the letter also refers to data processing and related telecommunications equipment. One of the first tasks of the Board was to circumscribe the kinds of equipment included in either or both of the above statements. After examining published works of reference, and opinions expressed by industry, the Board has interpreted these phrases to encompass a broad range of computing equipment and parts. They include, in the Board's view, all types of computer systems and their constituent units, support equipment designed to enhance the functioning of computers, related telecommunications equipment, parts used in the manufacture of finished computer products, and parts used for replacement purposes for computers in service. No single phrase is completely adequate to describe concisely the range of products under review, but the phrase "data processing equipment and parts" is perhaps the most indicative of the product coverage of this Reference.

THE PUBLIC SITTINGS, PROPOSALS AND BRIEFS

The public sittings relative to this Reference were held in the Board's courtroom in Ottawa on May 29 to June 1, 1972. Prior to the sittings, firms which were believed to be manufacturing or marketing the products under review and other interested persons were invited to submit proposals concerning the recommendations which the Board should make to the Minister. The invitation extended to include the wording and rates of duty of tariff items within the scope of the Reference. Briefs or submissions containing relevant facts, opinions and arguments in support of or against any proposals to be brought before the Board were also invited. Copies of proposals, briefs and submissions were circulated to interested parties and were made available on request. The major tariff and other proposals made to the Board are covered in Chapter I, and a summary of proposals appears in Appendix A.

Representations were received from the following; those represented at the sittings are indicated by an asterisk:

Associations

* Canadian Association of Data Processing Service Organizations, Ottawa, Ontario
* Canadian Business Equipment Manufacturers Association Inc., Rexdale, Ontario
* Canadian Petroleum Association, Ottawa, Ontario
Canadian Photographic Trade Association, Toronto, Ontario
* Electronic Industries Association of Canada, Ottawa, Ontario
The Canadian Life Insurance Association, Toronto, Ontario
* The Society of the Plastics Industry of Canada, Don Mills, Ontario

Companies

Bell & Howell Canada Ltd., Downsview, Ontario
Burroughs Business Machines Ltd., Don Mills, Ontario
* Canadian National Railway-Canadian Pacific Railway, Montreal, Quebec
Comterm Limited, Montreal, Quebec
* Datagen of Canada Ltd., Hull, Quebec
* Digital Equipment of Canada Ltd., Kanata, Ontario
Greyhound Computer of Canada Ltd., Toronto, Ontario
* GTE Automatic Electric (Canada) Ltd., Brockville, Ontario
* IBM Canada Ltd., Don Mills, Ontario
Infopro Limited, Don Mills, Ontario
International Computers of Canada Limited, Toronto, Ontario
Minnesota Mining and Manufacturing of Canada Limited, London, Ontario
* Northern Electric Company Limited, Montreal, Quebec; now Northern Telecom Limited
* Olivetti Canada Limited, Don Mills, Ontario
Rosson Enterprises Ltd., Vancouver, British Columbia
* Sperry-Rand Canada Limited, UNIVAC Division, Mississauga, Ontario; now Sperry Univac Computer Systems
Sweda International, Toronto, Ontario
* The National Cash Register Company of Canada Limited, Toronto, Ontario; now NCR Canada Ltd.

Individuals

J.M. Ardron, P. Eng., Burlington, Ontario

ORGANIZATION OF THE REPORT

Following this introduction, Chapter I discusses the issues relating to the tariff schedule applicable to imports of computing equipment and parts into Canada, and the proposals made by industry as solutions to these problems. In Chapter II the Board determines which products it considers to be within the scope of the Reference, and makes note of some products which are not considered to be relevant. Chapter III is a review of current tariff items that are used to classify computing equipment and parts, and is concerned with the value of imports by tariff item and by rates of duty. It also examines the tariff treatment accorded computing equipment by other countries.

In Chapter IV, the market for computing equipment in Canada is described, and its size is estimated. Attention is then directed at the value and characteristics of production in Canada. Chapter V continues the examination of the industry, including its international structure. Chapter VI discusses Canadian government policy and support for the computer hardware industry, and Chapter VII reviews Canada's imports and exports, and international trade in computing equipment among selected countries. Chapter VIII is an examination of the structure of production costs of computing equipment in Canada, and Chapter IX determines the significance of duty and other factors in accounting for differences in prices of computing equipment in Canada and in the United States.

Chapter X reconsiders the current situation regarding tariffs on computing equipment and parts in the light of the options available to the Board as solutions to the issues raised. Chapter XI presents the Board's conclusions and recommendations with respect to the tariff structure and rates. A number of statistical and other appendices are included, commencing at page 329.

SOURCES OF STATISTICAL AND OTHER INFORMATION

Published statistical data on the computing equipment industry in Canada are mostly lacking in both detail and scope. Statistics Canada includes data on production and shipments for part of this industry in its published statistics for the office and store machinery industry under Standard Industrial Classification (SIC) 318. Certain firms in the industry are included under other SICs. Data on imports are published by Statistics Canada under a number of commodity classes, the most significant of which are 771-22 - electronic computers and parts, and 771-20 - card punching, sorting and tabulating machines and parts. Data on exports are published, as far as can be determined, under a single commodity class, 771-21 - card punching, sorting and tabulating machines, electronic computers and parts. The Canadian Information Processing Society publishes the results of its annual survey of the number of computer installations in service in Canada, but in recent years it has discarded its inventory of extremely small computer systems because of survey difficulties. As far as international statistics relating to this industry are concerned, the Board has used the official statistical publications of certain selected countries in order to derive imports and exports. The Board has also made use of estimated data published by the International Data Corporation and Datapro Research Corporation, particularly where corporate revenues and related statistics are concerned.

In order to obtain additional information on the computing equipment industry in Canada, the Board sent out questionnaires to all known manufacturers of computing equipment, to importers, and to service bureaux and other users. Information on production obtained by means of the Board's survey indicated that 22 companies were actively producing computing equipment in Canada in 1972. In that year, the value of their shipments was estimated at $206.4 million. Additional information on imports was obtained from an analysis of unpublished customs entry data relating to two months of 1971. Certain supplementary data on exports were contained in industry responses to the Board's survey.

Information of a more general nature was also obtained from the briefs and submissions to the Board, and from the statements made at the public sittings. Meetings were held with representatives of firms in the industry, and members of the Board and staff visited many of the producers and importers of computing equipment. By means of these meetings, and through subsequent correspondence, the Board obtained information on product costs, prices and related tariff matters.

ACKNOWLEDGEMENTS

The Board expresses its appreciation to the firms in the computing equipment industry, to the industry's associations, and to all those who submitted briefs, participated in the public sittings and in the Board's surveys, and who, through discussions and in other ways, facilitated the task of the Board and of its staff. The Board also wishes to acknowledge the use of published information. The appropriate credits appear in footnotes and table sources.

GLOSSARY OF TERMS

To an uniniated reader, the terminology involved in most aspects relating to computers may appear confusing and complex. The fact that many companies use different terms for what is essentially the same product, adds to the confusion. Wherever possible throughout the report, the Board has tried to use plain, unambiguous language to describe all facets of the computing equipment industry. Inevitably, there are situations in which the use of industry terminology cannot be avoided; indeed, industry "jargon" may have been used inadvertently on rare occasions. While it is to be hoped that the text can be readily understood without further reference, certain terms used in this industry carry particular connotations which can be misinterpreted. For this reason the following glossary of terms has been included.

GLOSSARY OF TERMS

1. Algol	Acronym for ALGOrithmic language, which is a problem-oriented high level programming language for mathematical and scientific use.
2. Ancillary computer equipment	Usually denotes stand-alone peripheral devices, but sometimes used to refer to supplementary on-line peripheral devices.
3. Back panels	Computer mainframe panels that contain wiring for the interconnection of mainframe and system circuitry.
4. Basic	An algebra-like programming language used for problem solving by engineers and others who may not be professional programmers.
5. Bit	An abbreviation of binary digit.
6. BTN	Brussels Tariff Nomenclature.
7. CADAPSO[(a)]	Canadian Association of Data Processing Service Organizations.
8. CAL terminal	Computer terminal dedicated to Computer-Aided Learning. CAL is synonymous with computer-assisted instruction (CAI).
9. CBEMA[(a)]	Canadian Business Equipment Manufacturers' Association.
10. Central processing unit (CPU)	The segment of a computer system that contains the arithmetic, logic and control circuitry. Usually synonymous with mainframe.
11. Characters	Alphabetic, numeric and other symbols capable of being printed or displayed. The maximum number of character positions in main memory is a measure of capacity of some types of computer.
12. Chip	Piece of silicon wafer on which circuitry is etched.
13. CIPS[(a)]	Canadian Information Processing Society. This society publishes an annual census of computers in Canada.
14. Circuit board	Board on which circuits are printed or etched.
15. Circuit switching	The switching involved in linking subscribers on the public switched telephone network.

16. COBOL — Acronym for COmmon Business Oriented Language, which is a problem-oriented high level programming language for general commercial use.

17. Computer hardware industry — Companies engaged in the design, manufacture, sale and maintenance of computer products and parts. Most companies also provide software with pertinent products.
Synonyms: computer equipment industry, data processing equipment industry.

18. Computer industry — A very general term encompassing firms which derive revenues from the design, manufacture, sale, maintenance or use of computer products and parts.
Synonym: data processing industry.

19. Computer manufacturing industry — Companies engaged in the design and manufacture of computer products and parts. Many companies also sell and maintain their end-products; others sell both end-products and parts to OEMs.

20. Computer output microfilmer (COM) — Device for recording directly or indirectly, computer-generated data on microfilm.

21. Computer service bureau — A commercial firm whose prime source of revenue is derived from the sale of computer time.
Synonym: data processing service bureau.

22. Computer services industry — Mainly consists of service bureaux providing services by means of computer systems, but also includes: software houses, computer consultants, facilities management firms, data preparation firms, hardware maintenance service firms, educational firms and computer personnel placement firms.
Synonym: data processing services industry.

23. Computer system — Usually denotes a number of self-contained devices arranged or configured as an interconnected system of equipment, including a computer mainframe, peripherals, and, if required, related telecommunications equipment. Certain of the newer, smaller systems are contained in a single housing.
Synonyms: EDP system, data processing system.

24. Computing equipment — Used to describe one or all of: computer mainframes, peripheral equipment, related telecommunications equipment.
Synonyms: computer hardware, data processing equipment, EDP equipment, computer products.

25. Computing equipment supplier	An organization which supplies one or more products of computing equipment, i.e., mainframes, peripherals, related telecommunications equipment to users or potential users or OEMs.
26. CPA[(a)]	Canadian Petroleum Association.
27. CRT terminal	A computer terminal in which output is displayed on a cathode ray tube; keyboards are frequently attached to facilitate data input.
28. Diode	A component of germanium or silicon crystals that permits current to flow in one direction only.
29. Discrete component	Any separate circuit element, normally restricted to those performing a single function. See also part.
30. Disk storage	A device that stores data by magnetized recording on flat rotating disks.
31. Drum storage	A device that stores data by magentized recording on a rotating cylinder.
32. EIAC[(a)]	Electronic Industries Association of Canada.
33. Electron beam recorder	A device which utilizes an electron beam to write computer-generated data directly onto microfilm.
34. Electron tube	A device in which conduction takes place by electrons or ions between electrodes through a vacuum or gaseous medium with a gas-tight envelope.
35. External storage	Storage which is under the control of, but not necessarily permanently connected to, a central processor, and which can hold data or programs in a form acceptable to it. Examples include magnetic tape or disk. Synonym: auxiliary storage.
36. Facilities management firm	A company which operates a user's in-house computer system for a fee. The services provided may also include hardware selection, systems design and programming.
37. Ferrite core	A small piece of ring-shaped magnetic material, capable of receiving and holding an electromagnetic charge; used in some types of computer memories.

38.	Floppy disk	A magnetic recording disk for data storage of sufficiently thin construction as to be flexible.
39.	Fortran	Acronym for FORmula TRANslation, which is a problem-oriented high level programming language for mathematical and scientific use.
40.	Hardware	The physical equipment that constitutes a computer system, and its supporting devices.
41.	In-house	A term used to differentiate the location of user computer facilities as being on the user's premises rather than at a service bureau or elsewhere.
42.	Integrated circuit (IC)	A circuit in which all the components are chemically formed upon a single piece of semiconductor material.
43.	Logic panel	A computer mainframe panel containing logic circuitry.
44.	LSI	Acronym for Large-Scale Integration, usually a minimum of 100 circuits.
45.	Magnetic tape	A continuous strip of flexible plastic material coated with a magnetic oxide on which data may be recorded as a series of magnetized spots.
46.	Main storage	The main internal storage of a computer system from which instructions are executed.
47.	Memory	A widely used term meaning data storage, usually implying the main storage of a computer system.
48.	Message Concentrator	A type of switching device which collects, analyzes and transmits data from remote terminals to a computer. May also involve temporary data storage and code conversion.
49.	MICR	Acronym for Magnetic Ink Character Recognition.
50.	Modem	Modulator/demodulator used to convert digital data to audio tones and vice-versa.
51.	Multiplexer	A device which permits parallel teleprocessing transmissions to take place without interaction.

52. OCR	Acronym for Optical Character Recognition; the identification of printed characters by means of light sensing devices.
53. OEM	Acronym for Original Equipment Manufacturer. Usually reserved for end-product manufacturers.
54. On-line	Operation of input/output devices under direct control of the central processing unit.
55. Part	Used to describe any manufactured item, other than material, that is less than a unit of equipment. Synonyms: component, component-part, article, accessory, subassembly, assembly.
56. Parts supplier	An organization which supplies parts mainly to OEMs for assembly into computing equipment. May also supply some parts directly to users.
57. Peripheral equipment supplier	An organization which supplies peripheral equipment to users or potential users or OEMs. Does not supply mainframes, nor related telecommunications equipment.
58. Point-of-sale terminal	A computer terminal which has the capability of optically reading coded data inscribed on goods for sale.
59. Potential user	An organization or person, with an unfilled demand for computing equipment, and expected to become a user for the first time.
60. Power supply unit	A device which regulates and distributes electrical power to a computer system.
61. Printer	An output device which converts data into printed form.
62. Process control loop	An electrical circuit which provides for the control of a process, and which incorporates sensing, measuring and actuating devices.
63. Related telecommunications equipment supplier	An organization which supplies related telecommunications equipment to users, common carriers or OEMs. Does not supply mainframes, nor peripheral equipment.
64. Resistor	An element of an electrical circuit of which the principal characteristic is resistance.

65. Reusable storage media — Data processing media, such as magnetic tapes, on which different sets of data can be recorded on the same surface many times. In contrast to one-time storage media such as data cards and paper tapes.

66. Semiconductor — A class of materials with electrical conductivity between that of a conductor and that of an insulator.

67. Software — A general term used to describe all programs which can be used on a computer system.

68. Stand-alone peripheral — A device that is not normally connected to, and is usually operable independent of, a computer system. An example would be a data preparation device.

69. Supplier — An organization which supplies computing equipment and/or parts to users or to OEMs.

70. Systems supplier — An organization which supplies computer systems to users or potential users. Synonym: mainframe supplier.

71. Time-sharing — A method by which a particular computing device is used for two or more concurrent operations.

72. Transistor — A semiconductor capable of signal amplification.

73. TSUS — Tariff Schedules of the United States.

74. Unit of equipment — Denotes a self-contained device, apparatus or machine, connected to a computer mainframe, peripheral equipment, or related telecommunications equipment.

75. User — An organization or person owning or renting computing equipment. Not normally applied to a user of computer services.
Synonym: end-user.

76. Vacuum tube — An electron tube evacuated to such a degree that its electrical characteristics are essentially unaffected by the presence of any residual gas or vapor.

77. VDU — Acronym for Visual Display Unit.

78. Voice response system — A telephone-type terminal and associated computer apparatus capable of responding to digital interrogation in voice form.

(a) Terms relating to industry participants are as used by the Tariff Board throughout the Reference.

Source: Various glossaries and dictionaries as adapted by the Tariff Board.

CHAPTER I: ISSUES AND PROPOSALS

CHAPTER I: ISSUES AND PROPOSALS

The purpose of this chapter is to bring forward the issues relating to the tariff schedule applicable to imports of computers and related telecommunications equipment into Canada, and proposals put forward by the industry for their solution. These issues and proposals are based on submissions to the Tariff Board by companies and industry associations, on statements made at the public sittings, on responses by companies to questionnaires prepared by the Tariff Board, and on information gathered by the Tariff Board staff from discussions with company officials.

The chapter also indicates certain non-tariff problems relevant to the development of the industry in Canada which were brought or came to the attention of the Board.

TARIFF ISSUES

The main tariff issue confronting the computer hardware industry in Canada, according to submissions to the Board, is that the present tariff schedule, with minor exceptions, contains no explicit provision for computers, computer peripheral equipment, related telecommunications equipment, and component parts. This has resulted in recourse to the use of a large number of tariff items with a wide range of duties, and in concomitant difficulties and inconsistencies in tariff classification.

Difficulties of Tariff Classification

The fact that computer and related computing equipment are neither enumerated nor otherwise defined in Schedule "A" of the Customs Tariff has resulted in a situation where tariff items intended to be used for the importation of other commodities have been utilized for computer goods as well. In this circumstance, it is not surprising that the nomenclature of many of the applicable tariff items appears ill-suited to their use for the classification of computers and related computing equipment.

Apart from the unsuitability of the vast majority of existing tariff items to accommodate computer goods, the nature of computing equipment itself adds to the difficulties of classification. First, there is the difficulty of dealing with a very wide range of complex electronic, electrical and electro-mechanical equipment. Secondly, there is the problem of being able to define or describe computing equipment sufficiently well that it may be identified and differentiated from other types of equipment. Thirdly, there is a tendency in customs practice to treat units of equipment as entities, particularly if they are packaged separately, without acknowledgement of the "system of equipment" concept. Fourthly, there is the difficulty of dealing with a dynamic industry in which new devices are appearing in rapid succession, and which often pose new problems of classification upon their importation. These factors have rendered the task of classifying computer goods that remain unenumerated in the tariff schedule, one of difficulty and complexity.

The difficulties caused by the lack of eo nomine tariff items for computing equipment are further aggravated by "class or kind", "end-use" and "n.o.p." provisions. These have the effect of expanding the range of choices for tariff classification, of rates of duty, and generally add to the complexity of an already complex tariff schedule for the products and parts under review.

The Canadian Customs Tariff incorporates provisions for special tariff treatment for goods of a class or kind made in Canada and not made in Canada. The purpose of these provisions is to provide protection for goods made in Canada, while permitting access to the Canadian market, at a lower rate of duty, of goods of a class or kind not made in Canada. A number of tariff items applicable to computer equipment contain a "class or kind" provision, for example 44532-1, 41023-1, 43155-1, 42700-1; tariff item 42700-1 is the most important of these. Some industry spokesmen questioned the appropriateness of the class or kind provision. The spokesman for the Canadian Business Equipment Manufacturers Association (CBEMA) commented: "class or kind ... imposes massive administrative difficulties during the advancing technology."(1) On the other hand, the Electronic Industries Association of Canada (EIAC), representing parts manufacturers, wanted the class or kind clause retained. Its concern was with the possible misinterpretations that would consider discrete parts assembled in some unique combination as a class or kind not made in Canada, when the parts separately were available from Canadian production.(2)

A number of tariff items contain "end-use" provisions, permitting duty-free imports for certain specified uses, such as for laboratory or hospital work. Some tariff items also permit certain institutions, such as hospitals and universities to import articles free of duty. The most important tariff item that affects this Reference in connection with either "end-use" or "end-user" provisions is 69605-1. This item is discussed in more detail in the section on sales tax in Chapter III. It is sufficient here to note that it has been used extensively to classify computing equipment, inter alia, imported for use by certain types of non-profit institutions.

From another viewpoint, it has been alleged that the Canadian manufacturer is deprived of that part of the market supplied by imports entering under tariff items with "end-use" provisions. Datagen of Canada Ltd., estimated that this amounted to 50 per cent of the total potential Canadian market for its products.(3)

Tariff items with "n.o.p." (not otherwise provided for) provisions also were alleged to have added to the difficulties of classifying computing equipment and parts. The inclusion of an n.o.p. provision in a tariff item in the Customs Tariff indicates that this item is to be used for classifying a particular commodity in the absence of tariff items which, by their description and interpretation, can accommodate the commodity in question. EIAC believed that this principle should be preserved:

> The inclusion of "n.o.p." in respect of "parts" is recommended to preserve existing priority in tariff classification of those components presently enumerated eo nomine in the Tariff, some of which flow from previous Board studies (i.e., Reference No. 123).(4)

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(1) Transcript, Volume II, pp. 185-186.
(2) Transcript, Volume III, p. 162.
(3) Transcript, Volume III, p. 240.
(4) EIAC brief, p. 3.

On the other hand, Digital Equipment of Canada Ltd., expressed an opposite view: "n.o.p. should not be used at all in the administration of the customs tariff."(1) Similar pro and con arguments were presented by other parties.

Multiplicity of Tariff Items

In the absence of a specific tariff item, computer products and parts imported into Canada enter under a large number of tariff items having different rates which are frequently used for the same equipment. While the exact number remains in doubt, 93 items were brought to the Board's attention as having been, or believed to have been applicable, and 63 of these have indeed been used at one time or another to classify this equipment. The use of the large number of tariff items, each with a British Preferential (B.P.), a Most-Favoured Nation (M.F.N.), a General (General) and a General Preferential Tariff (G.P.T.),(2) has resulted in the application of a wide range of duties to imports of this equipment. As far as can be determined, the applicable rates range from Free to 20 p.c. B.P., Free to 25 p.c. M.F.N., and from 15 p.c. to 37½ p.c. for the General Tariff.

The absence of eo nomine items, the concomitant difficulties and inconsistencies of classification, and the general complexity of the tariff schedule with respect to computing equipment and parts are alleged to have affected the industry adversely. Some companies have noted that impact in a detailed manner; others have commented more generally. There was a consensus among the views expressed before the Board, however, that the present tariff schedule in its treatment of the products under review is antiquated, cumbersome and costly to administer. The following opinions were voiced at the public sittings and in the submissions presented to the Board.

It was felt that the large number of tariff items and the general complexity of the tariff schedule had resulted in administrative delays in Canadian Customs, and hence in delays in the clearance of urgently needed goods. Furthermore, a number of companies declared that the present tariff structure for computers and related telecommunications equipment is very costly to cope with, and that they believe this to be equally true for government. A specific example was given by an IBM spokesman at the public sittings:

> For instance, in our company a fairly typical data processing system is a system 370, Model 145. Even though it is a single system, it consists of 13 different machine types and it is imported under six different tariff items. The amount of administration effort required on the part of the importer and Canadian Customs to import a system such as this, is, in our opinion, unwarranted.(3)

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(1) Digital Equipment of Canada Ltd. brief, p. 3.
(2) M.F.N. rate less one-third, or the B.P. rate, whichever is the lesser.
(3) Transcript, Volume III, p. 273.

The difficulties encountered in classifying computing equipment and parts and hence the uncertainty with respect to which tariff items will be applicable makes it difficult for importers to know in advance the rate of duty and the amount of federal sales tax for which they are liable. It was said that this uncertainty affected the costing, pricing and marketing procedures and policies adversely; some companies in fact stated that they allocated duties and taxes evenly over their complete product line irrespective of whether some products enter free of duty while other products enter at a rate of 20 p.c.

Representations were made before the Board that the possible use of a large number of tariff items and the subsequent difficulties in classification mentioned above have resulted in inconsistent classification treatment of identical or comparable computer products. Several interested parties were of the opinion that this inconsistency had been the cause of different tariff treatment between one importer and another for the same equipment. It was held by some appearing before the Board that certain importers, well versed in tariff practices, take advantage of this knowledge and are able to enter equipment or parts at a favourable rate, while less sophisticated importers, unaware of all the possibilities, may be occasionally subject to higher rates of duty. The administration of the Customs Tariff with respect to computing equipment and parts was felt to be discriminatory and not neutral.

Other Tariff-Related Problems

From the evidence submitted at the public sittings it would appear that the prime concern of industry was with the inadequacies of the existing structure of the Customs Tariff in so far as it pertains to computing equipment and parts; the rate of duty applicable, or changes in the level of protection, appeared to be a secondary issue with most of the organizations which made representations.

As one would expect, most parties submitting views to or appearing before the Board expressed opinions concerning the adequacy or inadequacy of the existing levels of protection. Most felt that the rates of duty on computing equipment and on parts were too high; a few suggested that the existing levels should be maintained and two implied that the rates on parts were too low. Some expressed a concern about the tariff nomenclature only and indicated no views with respect to rates of duty. Not all interested parties concerned themselves with the whole range of commodities, or with all tariff items referred to the Board for study; the interest of some was confined to particular products, e.g., parts, cash registers, teletypewriters, bookkeeping machines, etc., and individual tariff items, such as 41400-1, 41405-1, 41415-1, 41430-1, including some not specifically referred to the Board.

The preponderance, in terms of the proportion of domestic production, of the representations brought before the Board recommended a lowering of duties; those proposals will be discussed in greater detail in the next section and are individually listed in Appendix A. A large sector of the industry, representing largely multinational companies, felt that the tariff had not been beneficial in expanding Canadian production of computing equipment and parts beyond normal market growth.

A substantial segment of the computing equipment producers expressed the view that the duty on parts, components and subassemblies was unnecessary because most of domestic production is exported and hence the duty paid on imported inputs is eligible for drawback. However, it was said, the duty drawback administration is costly to both the producer of computing equipment and to the government. In order to obtain the drawback a manufacturer is required to trace the specific parts through the stages of importation, inventory, production and sales, and to identify the pertinent documentation. Several manufacturers attested that these procedures are costly and time-consuming, and that some companies employ individuals concerned solely with this process. The multiplicity of tariff items used for computer parts tends to aggravate this problem.

It was contended by some that the rates of duty on computing equipment and on parts, components and subassemblies for computing equipment bear no relationship to the competitive disadvantage of domestic producers of computing equipment and parts in the Canadian market. It was argued that the applicable rates of duty really relate to the goods for which the original nomenclature was established, and not for computing equipment and parts which were subsequently included under that nomenclature.

It was also pointed out at the public sittings that the rate of duty applicable to computing equipment is frequently lower than the rates of duty on the parts, components, or subassemblies used in making that equipment. Canadian service bureaux, engaged in the provision of commercial data processing services, contended that they were at a disadvantage with respect to service bureaux in the United States because their computing equipment, accounting for between a third and a quarter of their operating costs, carries a duty while computer services can be imported duty-free. One Canadian service bureau noted that:

> We feel that it is anomalous that computer and computer components are subject to duty when imported whereas computer services may be imported from foreign-based computers on a duty free basis.(1)

The free entry of computer services, referred to above, was brought before the Board also with the contention that the present schedule lacks a provision for computer software. Computer software represents a perplexing problem in terms of customs administration. Unlike hardware, the characteristics of which can be described in much the same way as other industrial commodities, software is more intangible; in economic terms it is a service as opposed to a good or a commodity. For this reason, it is very difficult to circumscribe it for tariff purposes and, more significantly, assign a value to it:

> ... valuation of software is a very complex and difficult issue. Even where the cost of its development can be identified, it is not possible to know or measure the extent of software usage or the base over which costs are spread or how they should be applied to the individual user. For this and other reasons, software frequently is provided on "bundled" terms and its cost to the user is included in the rental or purchase price of the hardware with which it is associated.(2)

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(1) Comment in responses to Tariff Board Service Bureau Questionnaire.
(2) CBEMA brief, p. 42.

At present, a specific tariff item for software does not exist, and it is normally classified in accordance with the type of media on which it is registered or recorded. Duty is levied, for example, on the value of a reel of magnetic tape, without including the value of any software or data it may contain. The types of software that are considered in this Reference are discussed in Chapter II.

Representation was made by computer service bureaux that preferential entry into Canada of computing equipment for specified end-uses is inequitable. The Canadian Association of Data Processing Service Organizations (CADAPSO), representing a number of Canadian computer service bureaux, has stated that:

> Duty levied on imported computers, related telecommunications equipment and attachments be equally assessed with no distinction relative to end users. All governments, Crown corporations, federal and provincial agencies, educational establishments, commercial organizations and equipment manufacturers be assessed equal duty levies at all times.(1)

The lack of a provision for used computing equipment was also noted before the Board. Concern was expressed by a leasing company that there is a danger that Canada might become a dumping ground for used equipment unless it is further differentiated from new equipment, and a sufficiently high tariff is imposed.

TARIFF PROPOSALS

The prime concern of most parties appearing before or making submissions to the Board was with the lack of tariff items in the Customs Tariff pertaining specifically to computing equipment and parts. As a consequence, most of the representations proposed first, the addition of one or more new tariff items to the Customs Tariff Schedule to cover these goods specifically and second, the levels of duty to be applied to this equipment. The Board also received proposals on tariff issues other than those relating to the Customs Tariff.

Although the need for a specific coverage of computing equipment and parts in the Canadian Customs Tariff was widely accepted by the industry, there was by no means agreement on the number of new tariff items or the exact nomenclature to be employed. Some proposed one consolidated tariff item for all computing equipment and one item for parts and materials used in the manufacture of that equipment; others proposed several new tariff items, one each for computers, peripheral equipment and related telecommunications equipment. Some proposed a nomenclature with "n.o.p." and "made in Canada" provisions, others did not. Similarly there was no agreement on rates of duty, even though most proposals suggested retaining or lowering the present level of protection. The individual proposals have been summarized in tabular form and appear in Appendix A. A digest of the thrust of the proposals is given below.

(1) CADAPSO brief, p. 2.

Proposals for New Tariff Items

A recurrent theme of the submissions, and of the declarations at the public sittings, was the need to acknowledge the rapid advances in computer technology and, hence, in computer hardware. Furthermore, according to the industry, this very rapid succession from one generation of equipment to another suggests either a very broad, all-inclusive nomenclature, which can accommodate the technical and technological advances because of its generality, or a nomenclature which specifies, in precise terms each relevant product, and which can be amended as a new product is introduced and an old one becomes obsolete. The majority of submissions tended to favour a broadly defined tariff item. Typical of this line of reasoning was the proposal by CBEMA, on behalf of the thirteen members belonging to its computing equipment group, which recommended two tariff items:

1. Computers and related data processing machines and apparatus, support equipment designed and intended for use therewith, including magnetic tape units, sensor based input/output units, input/output typewriters, related teleprocessing machines and apparatus, reusable storage media, interconnecting cables, controls, accessories, and attachments; parts of all the foregoing.

2. Articles and materials that enter into the cost of manufacture of the goods enumerated in tariff item 1, proposed above.(1)

Several organizations appearing before the Board, which were not members of CBEMA, supported its recommendation for a broad consolidated nomenclature for computing equipment and parts. They were Comterm Limited, International Computers of Canada, Ltd., GTE Automatic Electric (Canada) Ltd., the Canadian Association of Data Processing Service Organizations (CADAPSO) and The Canadian Life Insurance Association.

Certain companies in general agreement with the items and nomenclature proposed by CBEMA recommended a number of variations. Northern Electric Company Limited recommended that related telecommunications equipment be classified separately from computers and other related equipment. This company also indicated that existing tariff items, enumerating components eo nomine, should remain unchanged, and that any parts item be provided with an "n.o.p." provision. IBM Canada Ltd., recommended a nomenclature even more general than the one proposed by CBEMA by omitting the word "computers" and confining the item to "data processing machines and apparatus"; it also omitted "reusable storage media" from its proposed tariff item, a wording included by CBEMA.

A somewhat more specific nomenclature than the one proposed by CBEMA was put forward by the Canadian Petroleum Association (CPA). It recommended three tariff items: one for "computers and ancillary computer equipment of a class or kind available in Canada from Canadian manufacturers"; a second for computers and ancillary computer equipment, n.o.p., not made in Canada, and parts; and a third, for complete parts when used for the manufacture of computer goods.

(1) CBEMA brief, Exhibit VIII.

The Electronic Industries Association of Canada also proposed a broadly defined nomenclature for finished computer products and parts. This association, however, recommended the inclusion of an n.o.p. provision and a provision for made/not made in Canada. The n.o.p. provision to the parts item was deemed necessary to preserve the existing priority of "eo nomine" parts tariff items. The recommendation with respect to maintaining the applicability of existing "eo nomine" parts items was supported by Northern Electric Company Limited, especially with respect to tariff items 44544-1 "transistors and semiconductor devices" and 44542-1 "electron tubes." The "made in Canada" provision applicable to both the item for equipment and to the parts item was for the purpose of providing protection to equipment and parts made in Canada, while allowing duty-free entry to equipment and parts not made in Canada.

The use of conditional clauses was, however, the subject of diverging opinion. Digital Equipment of Canada Ltd. was opposed to the use of "n.o.p." provisions anywhere in the Customs Tariff, while Sweda International and The Monroe Calculator Co., Divisions of Litton Business Equipment Ltd., were opposed to the use of an "n.o.p." provision in tariff item 41415-1 "Bookkeeping, calculating and invoicing machines and complete parts thereof, n.o.p."

In contrast to a broadly defined nomenclature for a new tariff item for computing equipment and parts, Digital Equipment of Canada Ltd., favoured a nomenclature which would define in precise terms computers, peripheral equipment, related telecommunications equipment and parts. Furthermore, there would be additional specification of computer, peripheral equipment and parts by kind or type and a breakdown of telecommunications equipment between mechanical and electronic equipment; mechanical telecommunications equipment to carry a rate of duty different from computer equipment.

A few companies suggested that the Brussels Tariff Nomenclature was a useful guide for the classification of computers and related telecommunications equipment, and proposed that the BTN format and nomenclature be adopted by Canada.

The Board also received some proposals with respect to a number of existing tariff items; these proposals were largely based on a concern that any new nomenclature for computing equipment and parts would supersede certain existing tariff items, or could involve a change in nomenclature of such existing items. For example, Northern Electric Company Limited proposed that the nomenclature and rates of duty of tariff items 44506-1, "electric telegraph apparatus and complete parts thereof," 44508-1, "electric telephone apparatus and complete parts thereof, n.o.p.," and 44533-1, "radio and television apparatus and parts thereof, n.o.p." should remain unchanged.

The CPA proposed that the wording of the new tariff item(s) with respect to computing equipment be worded in such a manner that specialized computing equipment used exclusively for processing geophysical seismic data would continue to be classified under tariff items 49104-1 and 49105-1. These items read as follows:

		B.P.	M.F.N.	General	G.P.T.
	All other machinery and apparatus, and parts thereof; parts of goods enumerated in item 49103-1:(1)				
49104-1	Of a class or kind made in Canada	5 p.c.	10 p.c.	20 p.c.	5 p.c.
49105-1	Of a class or kind not made in Canada	Free	Free	Free	Free

Proposals for Tariff Rates

The tariff rate proposals were largely a reflection of the specific interests of the respondents, and their positions within the structure of the industry. Many factors appear to have influenced the various rate proposals, including: company size, competitive capabilities, types of product manufactured or sold, and particularly the degree to which the company is engaged in international trade in computer products or parts. These tariff proposals are set out in Appendix A.

CBEMA, an association composed mostly of subsidiaries of multinational producers of computing equipment and parts, recommended free rates of duty under the B.P. and M.F.N. Tariffs and 25 p.c. under the General Tariff for both complete equipment and parts and on articles and materials used in the production of complete equipment. The CBEMA recommendation of free entry under the B.P. and M.F.N. Tariffs for computing equipment was supported by a number of organizations, especially in respect of equipment of a class or kind not made in Canada. In the case of computing equipment of a class or kind made in Canada some representations were received recommending tariff protection. The Electronic Industries Association of Canada recommended 15 p.c. B.P., 15 p.c. M.F.N. and 25 p.c. General; Canadian Petroleum Association recommended 10 p.c. M.F.N.; Digital Equipment of Canada Ltd. and GTE Automatic Electric (Canada) Ltd. did not recognize any distinction with respect to the "made in Canada" and "not made in Canada" provisions and recommended 10 p.c. and 15 p.c. M.F.N. respectively. Datagen of Canada Ltd. proposed that the present level of protection on computing equipment be maintained.

IBM and NCR, respectively, recommended an M.F.N. rate of 10 p.c. and from 7.5 p.c. to 10 p.c. M.F.N. on computer equipment. These two companies also recommended an "earned" duty remission program under which the companies would earn, with production of computing equipment and parts in Canada, the remission of duty on imports of computing equipment not made in Canada; the amount of duties remitted would bear a direct relationship to the amount of manufacturing carried out in Canada. IBM, it is noted, is both the largest importer and the largest manufacturer of computing equipment and parts in Canada.

(1) Tariff item 49103-1 provides for "Drilling, servicing or work-over rigs, assembled or not; Draw works; Slush pumps; Motive power and drive groups for operating slush pumps, draw works or rotary table."

Most submissions made to the Board recommended free entry into Canada for parts for computing equipment. The CBEMA presentation extended this duty-free recommendation not only to parts used in the manufacture of computing equipment but also to parts used for repair and replacement purposes. Some submissions confined their recommendations to manufacturing parts only. The major exception to the unconditional proposal for a free M.F.N. rate of duty on parts came from the Electronic Industries Association of Canada, which includes many Canadian parts producers. It proposed a rate of 15 p.c. under the B.P. and M.F.N. Tariffs and 25 p.c. under the General Tariff for "parts, assemblies and subassemblies" of a class or kind made in Canada, but free entry under the B.P. and M.F.N. Tariffs and 25 under the General Tariff when of a class or kind not made in Canada. The provision of free entry when not made in Canada was supported by Comterm Ltd. CADAPSO, the organization representing a number of computer service bureaux, suggested that the rates of duty for parts should be the same as the rates for computing equipment. The Society of the Plastics Industry of Canada proposed that "parts of plastic for computer and related telecommunications equipment" enter free of duty when not made in Canada, but carry a rate of 15 p.c. B.P., 17½ p.c. M.F.N. and 30 p.c. General when made in Canada.

The Board also received a number of proposals with respect to rates for existing tariff items rather than for new tariff items pertaining to computing equipment and parts. CN-CP Telecommunications proposed duty-free entry for heavy duty teletypewriters and teleprinter equipment and component parts entering under 44506-1 when of a class or kind not made in Canada; as pointed out previously Northern Electric Company Limited, a producer of telecommunications equipment, proposed that the nomenclature and rate of this item, as well as of items 44508-1 and 44533-1, should remain unchanged. Sweda International and Monroe Calculator Co., Divisions of Litton Business Equipment Ltd., proposed that tariff item 41430-1, "cash registers," be provided with a "class or kind made/not made in Canada" provision and that the rate be reduced from 20 p.c. B.P., 20 p.c. M.F.N., to Free B.P., 10 p.c. M.F.N.; it was also recommended by these firms that the rates of 10 p.c. M.F.N. on tariff item 41415-1 (calculating machines) be reduced to Free M.F.N.

Other Tariff-Related Proposals

A number of presentations were brought before the Board which, in addition to discussing the nomenclature and the rates of duty applicable to computing equipment and parts, dealt with other tariff-related issues. For example CADAPSO, the service bureaux' organization, and Comterm Limited proposed that the duty-free access by universities and other educational institutions to imported computing equipment under tariff item 69605-1 should be abolished. On the subject of inequitable treatment, International Computers of Canada Limited suggested that the regulations administered by the Department of National Revenue pursuant to sections 35 to 44 of the Customs Act with respect to valuation for duty be applied on the same basis for every importer. CBEMA and IBM proposed that computer software should not be provided for in the Customs Tariff, and that no duty should be levied on it.

NON-TARIFF ISSUES

Several submissions brought before the Board recognized that, while tariff structures and rates of duty are important instruments in fostering industrial development, the use of these instruments alone may be insufficient to counteract problems encountered by particular industries. It was said that changes in the level of tariff protection would present a partial solution only and that, hence, tariff questions should be viewed more properly in conjunction with other problems and other policy initiatives.

> Tariff policy should be co-ordinated with the other industrial policy instruments, including Federal purchasing policies, to provide a climate which is more conducive to long-range planning and investment in the industry; special consideration should be given to countervailing policies within the various departments and agencies.(1)

Furthermore, the relative importance of the tariff as against other instruments for developing the computing equipment industry in Canada was also questioned:

> ... because the computer industry is characterized by rapid technological obsolescence and massive capital requirements, the risks involved are substantial and will be undertaken in Canada only if a favourable government climate exists. Such a climate involves a long range integrated industrial plan on the part of the Federal Government, for it is worth noting that tariffs on computing equipment in the past have not - of themselves - stimulated Canadian production of the equipment in Canada.(2)

> ... computer manufacturing activity seems to have been stimulated more by the Department of Defence Production and, in recent years, by the Department of Industry, Trade and Commerce than by the Tariff. We believe that this type of aid is likely to provide a better stimulant for manufacturing than the tariff.(3)

For these reasons other problems affecting the industry are indicated below and some are explored in greater depth in other chapters of the Report. Information concerning non-tariff issues is derived from published governmental and industry sources, submissions to the Board, discussions with industry officials and from Tariff Board questionnaire responses.

Taxes and Allowances - The Canadian computer industry has expressed its concern with regard to the levels or rates of three types of federally imposed taxes and allowances. The industry, in 1972, was concerned that the corporate income tax rate of 49 per cent was higher than rates in other countries competing with Canada in the production of computing equipment. The taxation rate was reduced late that year and the industry has recommended that this reduced rate be maintained for the foreseeable future to provide a more certain basis for long-term planning.

(1) NCR brief, p. 8.
(2) CBEMA brief, p. 3.
(3) INFORPRO Ltd. brief, p. 1.

Concern was also expressed by the industry at the inadequacy of capital cost allowances permitted for corporate tax purposes in Canada. At the time of the hearing, the allowance on most computing equipment was at the rate of 20 per cent a year on a declining balance. Process control and other equipment used directly in a production process, however, can be written off completely over a two-year period. The industry has urged that this rule be extended to all computing equipment. Furthermore, it was claimed that the incidence of the federal sales tax on domestically produced equipment is higher than that on the equivalent imported equipment, thus affecting adversely the competitiveness of computing equipment manufactured in Canada. It was said that for imported goods, the federal sales tax is applied on the duty-paid value, while for domestically produced equipment it is levied on the manufacturer's selling price. This, it was alleged, results in more taxes, apparently on the assumption that the latter is a higher base for calculating the federal sales tax.

Government Procurement Policy - A number of companies expressed the view that federal government procurement policies for computer goods were too narrowly formulated. It was the general assertion by industry that computer goods manufactured in Canada, with a sufficient amount of Canadian content, may receive a 10 per cent advantage over foreign-made equivalent goods. However, it was pointed out that if the policy is based on particular devices, and each device is subject to Canadian content rulings, then it would be virtually impossible to meet these Canadian content criteria except in a small number of instances where the adoption of rationalized production and the device requirements happen to coincide. Thus, for some multinational companies particularly, federal government procurement policies are not consistent with other government policies which encourage the establishment and extension of rationalized production in Canada. Among the companies concerned with this issue were Digital Equipment of Canada Ltd., IBM Canada Ltd., and the National Cash Register Co. of Canada Ltd.

Foreign Ownership and Control - The matter of foreign ownership and control of the Canadian computer hardware industry was raised by CBEMA, which is concerned that government policy in this area may have a stifling effect:

> Another important area of concern at the present time, if the maximum potential is to be realized, is the regulation of foreign ownership. The international character of the computer industry makes this area of Government policy formation extremely sensitive. Most of the CBEMA Computer Group members operate in a large number of countries and have demonstrated a capacity for good corporate citizenship in line with the national objective of the host countries. It is the hope of CBEMA that the Federal Government's foreign ownership policy will contribute to, rather than hinder, the growth of the computer industry.[1]

Canadian-owned companies did not voice concern in their submissions to the Board with respect to foreign ownership and control.

(1) CBEMA brief, p. 48.

Size of the Domestic Market - The multinational computer manufacturing companies allege that the Canadian market is too small by itself to sustain viable economic production of computing equipment or parts. CBEMA and IBM Canada Ltd., commented on this problem:

> The Canadian market alone will not support on an economic basis development and production of entire computer system product lines -- or even of single components or products -- which will meet the diverse requirements of even a major fraction of Canadian users. In short, the miniature replica approach to production of computers by the Canadian industry, on a basis in parallel with the U.S., simply is not practical. Furthermore, failure to provide Canadian users with the latest and most productive equipment which best meets their needs would compromise the capability of those users to compete in world, or even domestic markets.(1)

> To be successful Canadian computer manufacturers must manufacture for foreign markets because the Canadian market itself does not offer the volumes necessary to achieve economies of scale. At present the Canadian tariff provides little protection for Canadian parts manufacturers since most production is exported. Duty on imported parts is subsequently recovered by way of duty drawback when the finished item is exported. Therefore, the Canadian parts manufacturer has no real advantage over the foreign parts manufacturer.(2)

Co-ordinating of Government Policies - The need to view tariff questions in conjunction with other problems was noted earlier. The logical extension of this consideration is to prescribe government policies that are co-ordinated in their objectives and implementation. CBEMA has addressed this problem in the following manner:

> While CBEMA recognizes the specific terms of reference of the Tariff Board, it urges the Board to give consideration to the relationship of all the Federal Government policies concerning the industry and their relative and total impact ... CBEMA has identified fourteen Federal Government departments and agencies whose policies and programs have a significant influence on the industry. The apparent divergent interests of these bodies provide an uncertain climate in which to formulate corporate strategies. For this reason, CBEMA urges that tariff policy be based on a practical appreciation for the industry opportunities, challenges and strategies and the complex Government climate in which the industry must operate.(3)

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(1) CBEMA brief, p. 29.
(2) IBM Canada Ltd. brief, p. 6.
(3) CBEMA brief, p. 49.

CHAPTER II: THE PRODUCTS UNDER REVIEW

CHAPTER II: THE PRODUCTS UNDER REVIEW

In his letter of reference to the Board, the Minister of Finance instructs the Board to consider, "computers and related telecommunications equipment"; the letter also refers to "data processing and related telecommunications equipment." It is the purpose of this chapter, therefore, to discuss and establish which products fall within the scope of this letter of reference.

The first part of this chapter presents some of the more pertinent views of the industry on the scope of this Reference. In this part, the Board also presents the opinions of some organizations who specialize in the field of electronic data processing. In the second part of this chapter, the Board sets forth its own considerations concerning the scope of this study. In doing so the Board first discusses the terminology used in the Minister's letter, along with some other concepts used currently to describe the goods in question. The Board then describes which groups of products it considers to be within the scope of this Reference and what types of products should not be included.

INDUSTRY VIEWPOINTS

Most of the submissions presented to the Board by the industry and the majority of the views expressed at the public sittings dealt primarily with the nomenclature of the proposed tariff item(s). Few of the submissions or presentations examined specifically which products would be included under such a nomenclature, or which products would be excluded. However, several people appearing before the Board did comment on the scope of the Reference and some of these remarks are presented here.

The Canadian Business Equipment Manufacturers Association (CBEMA) was of the opinion that the scope of the Reference covered electronic data processing equipment encompassed by a definition published by the Treasury Board of the Government of Canada:

> ... electronic data processing equipment was taken as encompassing those devices that can perform a systematic sequence of substantial logical or arithmetic operations on numerical or alphabetic quantities without intervention by a human operator. Also included as equipment to be considered was auxiliary equipment operating in support of such devices, and data collection and data preparation equipment which gather data for input to such devices. Excluded from consideration was equipment which is used solely as an integral part of a process control loop, a scientific experiment of a military weapons system. Thus, the devices considered are those often described as general purpose digital computers.[1]

Of particular interest in this definition is the use of the words "electronic data processing." CBEMA did not agree, however, with the exclusion from the definition of equipment which is used for the purpose of automatic process control or military weapons systems, because it believed that present and future designs of computers and future designs of computers and related equipment could perform both the excluded functions and those of general purpose digital computers.

(1) CBEMA brief, p. 24.

The Electronic Industries Association of Canada (EIAC) suggested that the words "data processing apparatus" might express the scope of the Reference more accurately than data processing equipment. It was felt that the word "apparatus" was open to a broader interpretation than other words, such as equipment, and would permit the inclusion of computers for process control purposes, and other special purposes.(1) In response to a question by the Board, Datagen of Canada Ltd. indicated also that process control computers should fall within the scope of the Reference.(2)

IBM Canada Ltd. was of the opinion that since the individual units of a data processing system do not operate independently, classification should be based on the systems concept rather than on the function or construction of each particular unit. In order to elaborate upon what constitutes a data processing system, the company provided a list of the units of equipment comprising such a system:

Central processing unit (CPU);
input and output devices;
storage devices;
additional separate units, such as, core storage, control, adapter and power supply units;
other data processing machines, including data entry, verifying, punch card calculating, interpreting, card manipulating, and tabulating equipment.

GTE Automatic Electric (Canada) Ltd. commented on the difficulties of determining whether a product should be included within the scope of this Reference. It stated:

> A major factor to which consideration must be directed is that the lines of distinction between various types of products manufactured by the computer, office equipment, telegraph, telephone, measurement, microfilm and other telecommunications industries has considerably blurred in recent years. Office equipment such as adding machines, typewriters and teleprinters are increasingly adding memory systems and being made with discrete components and integrated circuits ... Similarly, telephone systems now incorporate a substantial computer capacity ...(3)

This blurring between various product groups was also of particular concern to Northern Electric Company Limited because it felt that this might lead to inclusion of telecommunications equipment in the scope of this Reference. This company said that the Reference should concern itself with only telecommunications equipment that was directly related to data processing.

The Board also examined the definitions and products descriptions of three organizations that specialize in data processing. Two of these companies, Datapro Research Corporation and Auerbach Publishers Inc., publish on a regular basis analyses of particular products in the computer field for potential buyers. The third company, International Data Corporation, publishes a regular newsletter dealing with various aspects of the electronic data processing industry.

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(1) Transcript, Volume II, p. 168.
(2) Transcript, Volume III, p. 257.
(3) GTE Automatic Electric (Canada) Ltd. brief, p. 1.

Datapro publishes a report entitled "Datapro 70, the EDP Buyer's Bible", in which electronic data processing is divided into the following categories: general-purpose digital computer systems, minicomputers, small accounting computers, peripherals, computer output microfilmers, computer-related telecommunications equipment and software. Analog and hybrid (analog/digital) computers are excluded; voice response systems are included under peripheral equipment which, although a seemingly logical inclusion raises questions concerning the status of telephones as electronic data processing terminals. This company also noted the absence of strict demarcation lines between types of equipment used in electronic data processing.

Auerbach Publishers Inc. reinforces the broad interpretation of data processing as encompassing a wide range of equipment. Its main publication, "Standard EDP Reports" in eight volumes, covers general purpose digital computer systems only. In its "Computer Technology Reports" the company deals with data communication, input/output, minicomputers, microfilm, software and time sharing. In addition the company publishes a series of reports on data processing which comprise the following subjects: alphanumeric displays, automatic photocomposition, computer output microfilm, data collection systems, data communications, data communications terminals, data entry systems, digital plotters and image digitizers, large-scale memories, microfilm readers/printers, minicomputers, optical character recognition, small business computers, software for business accounting, systems software and time sharing. The range of the products covered under data processing is illustrated by the inclusion of automatic photocomposition, digital plotters and image digitizers, and microfilm readers/printers.

International Data Corporation has also addressed itself from time to time to the problems of classification and definition of electronic data processing equipment. In this respect, its annual computer census was most useful. Of special interest, because this deals with the problem of computer systems for process control and other special-purpose computer systems, is the basic division between two types of computer systems:

> 1. General Purpose Digital Computers (Group A): The computers included in Group A comprise the bulk of digital computers (by value) in operation. They are byte or character oriented -- with the exception of large-scale scientific machines -- and are programmed with higher-level languages.[1]
>
> 2. Dedicated Application Digital Computers (Group B): Dedicated application (Group B) computers are defined as those commonly called minicomputers, plus certain larger systems designed primarily for one application -- such as process control, data communications, and data entry. (These) computers are typically word oriented (8, 12, 16, or 24 bits per word), usually sold outright, and predominantly programmed in machine language.
>
> Definition becomes increasingly difficult, and subjective judgment is often necessary when considering specific machines. For example, "office accounting computers"

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(1) EDP Industry Report, Vol. 9, No. 13, International Data Corporation, Newtonville, Massachusetts, April 19, 1974, p. 14.

(visual record computers in Europe) -- such as Burroughs' E and L Series or TC-500, Litton/ABS 1200 Series, NCR-399, Nixdorf 820, and Singer 5800 -- are excluded; included, however, are "data entry" oriented such as Eldorado 140, Four Phase, and MAI's Basic Four since they compete with other "minis", yet do not fit EDP/IR's definition of General Purpose (Group A) computers.[(1)]

These two broad classes cover the vast majority of computer systems. International Data Corporation, it should be noted, omits office accounting computers from the above classification, as well as analog computers, because presumably they are ill-suited to either classification.

THE PRODUCTS UNDER REVIEW

In accordance with the letter of reference, this study's concern is with "computers and related telecommunications equipment." However, it is far from clear which products fall within this terminology. There was considerable difference of opinion at the public sittings on the meaning of the word computers. Must they have a minimum memory size? One member of the industry said that a computer "must contain a read-write memory of at least 4,096 words, with a minimum word-lenght of eight bits."[(2)] Do computers include automatic process control systems? The answer is affirmative if a computer is defined as "any machine which could accept data in a prescribed form, process the data and supply the results of the processing in a specified form as information or as signals to control automatically some further machine or process."[(3)] However, it is significant to note that this definition would exclude the machine or equipment that is controlled by the signals. This raises questions about the new generation of electronically-controlled machines and devices, such as typewriters or desk calculators, which incorporate computer logic, sometimes in the form of microprocessors. Are they, by reason of the microprocessor computers, or are they typewriters or calculators? Or is only the microprocessor a computer?

The term "computers and related telecommunications equipment" also appears to be somewhat restrictive in scope, if taken literally. Two groups of equipment only are mentioned: computers and related telecommunications equipment. There is, however, a whole range of equipment which, like telecommunications equipment, is used in conjunction with computers and is, therefore, "related". This other related equipment also falls within the scope of this Reference.

It appears that the term "computer system" describes the scope of the Reference more accurately than the word computer. A computer system has been defined as "a central processor and associated peripheral units which are or can be on-line with the processor."[(4)] Clearly, the term "computer system," including a central processor as well as the interconnecting peripheral equipment, is more comprehensive than the word "computer." It should be noted that this broader meaning is not precluded by the letter of reference since a computer, in the current usage of the word, can refer to either a central processing unit or a computer system, depending on the context.

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(1) ibid., No. 16, May 30, 1974, p. 5.
(2) Digital Equipment of Canada Ltd. brief, p. 2.
(3) Chandor, A., A Dictionary of Computers, Penguin Books Ltd., Harmondsworth, England, 1973, p. 82.
(4) ibid., p. 85.

Another area of uncertainty is whether the scope of the Reference should include only electronic equipment, or electro-mechanical equipment as well. The problem is that whereas there is equipment that is wholly electro-mechanical, there is very little electronic equipment that does not incorporate some electro-mechanical operations. The word computers, on the basis of existing technology, usage and understanding, suggests that the subject matter of this Reference should be confined to electronic computers and electronic data processing equipment, even though such equipment may, in part, be electro-mechanical.

However, even the scope of the study expressed as "computer systems and related telecommunications equipment" might still be considered to be narrowly defined. There are groups of products which, although they are not connected with the central processing unit, nevertheless, contribute indirectly to the performance of the main function of the computer, for example, key punch machines. "Data processing", therefore, appears to cover not only computers but also all the other equipment related to the computer and to data processing.

The term "automatic data processing" is frequently used to describe computers and related equipment. The United States of America Standards Institute defines automatic data processing equipment as "equipment such as electrical accounting machines and electronic data processing equipment."(1) Electrical accounting machines are defined by the same authority as "data processing equipment that is predominantly electro-mechanical, such as key punch, mechanical sorter, collator, and tabulator."(2) Automatic data processing equipment, thus, would include both electro-mechanical and electronic equipment. Sometimes "automatic data processing" is used to indicate more specifically "work performed by electro-mechanical equipment as contrasted with data processing performed on electronic computers."(3) In other words, automatic data processing would, according to this definition, relate more to electro-mechanical equipment than to electronic equipment.

"Electronic data processing" is probably the most widely recognized term descriptive of all of the functions associated with computers. Electronic data processing differs from other descriptions in that it specifies a function carried out by electronic equipment.(4) While electronic data processing pertains to equipment that is largely electronic, it does not suggest that such equipment depends exclusively on electronic devices. At present, with the exception of the central processing unit, virtually all devices of a computer system contain some element of a mechanical or electro-mechanical nature. However, it may be that the use of the term "electronic" to circumscribe "data processing equipment" might be interpreted too narrowly as referring to electronic equipment only, and would, therefore, not encompass "related" electro-mechanical devices.

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(1) USA Standard Vocabulary for Information Processing, United States of America Standards Institute, New York, N.Y., 1966, p. 15.

(2) ibid.

(3) Chandor, A., A Dictionary of Computers, Penguin Books Ltd., Harmondsworth, England, 1973, p. 40.

(4) Sippl, Charles J., Computer Dictionary and Handbook, Howard W. Sams & Co. Inc., Indianapolis, Ind., 1966, p. 24.

Considering the wording of the letter of reference, and in view of the opinions expressed by industry and the statements by experts on this subject, it seems that "data processing equipment and parts" best describes all the products that as separate or as interconnected units constitute the scope of this Reference. This term is sufficiently comprehensive to encompass not only computers but also computer systems, their support systems and related telecommunications equipment. It includes all equipment, separate units and interconnected systems, required to carry out the function of data processing. The Board feels that this term does not preclude electro-mechanical devices which are part of a data processing system, even though this system is predominantly electronic. It incorporates, besides completed units and systems of completed units, parts used in the manufacturing and maintaining of this equipment.

The term data processing seems to exclude computers or computer systems used for purposes other than data processing, such as process control. However, the Board feels that special purpose computers and computer systems, not yet part of broader control systems, also fall within the scope of this Reference. The same applies to analog and hybrid computers and computer systems, even though currently their use is declining. As noted in the introductory glossary, although the term "data processing equipment and parts" is the most germane to this Reference, the Board frequently refers throughout the Report to "data processing equipment" or "computing equipment" or "computer hardware." These terms are used interchangeably to indicate, unless otherwise specified, the total range of equipment and parts under review.

The Systems and Products

The Board did not attempt to prepare a complete and exhaustive study of all equipment and devices that are comprised by the term, "data processing", nor of all the materials, parts, components and subassemblies required to assemble this equipment. One major reason for this was the large number of distinct types of products and the even greater number of models that are currently available. One company in the industry reported that in 1972 it maintained a catalogue of 770 models of 289 data processing products. If the various models and products manufactured by other companies in the computer hardware industry, of which there are over two hundred in the United States, are added, then there are literally thousands of models covering perhaps four hundred different types of products. Such a vast array of equipment does not permit item by item consideration.

Another reason for not doing so is that this list would be out of date almost immediately due to the rapid pace of product change as a result of technological advances and innovations. One of the major characteristics of the computer industry is the almost constant enhancement of current products, the appearance in rapid succession of new products and the obsolescence of older products after only a relatively brief existence. This phenomenon has important implications for the classification and definition of these goods for tariff purposes; a broad and general nomenclature will remain current much longer than one with considerable product detail, which would require frequent revision.

Moreover, an item-by-item listing would include products which would not fall exclusively within the scope of this study. Many products perform several other functions in addition to fulfilling the data processing function covered by this review. A striking example of this is a point-of-sale terminal which would be a relevant product when used as an integral part of a computer system, but not when used as a cash register.

What appears to be required is a framework in which to situate the products, together with product designations and descriptions, that are as concise and unambiguous as possible. The major groups of data processing equipment are presented below.

Computer Systems

The Board has compiled from a wide variety of industry and other sources the broad classes of systems considered relevant to this Reference:

General Purpose Digital Computer Systems - As the name implies, these systems are designed to perform multivarious tasks in which some degree of computation and/or manipulation of data at high speed is required. They normally consist of a central processing unit, and various peripheral devices that allow for the input, computation, output and storage of data. These systems range in price from $50,000 to $11,000,000, or are available under rental contracts from about $15,000 to 3,000,000 per year.

Minicomputer and Microprocessor Systems - Although not easily distinguishable from general-purpose systems, these systems are normally considered as a separate class because of differences in price, size, application, and, in most instances, in their internal architecture. Perhaps the most important difference has been the utilization of the minicomputer for single, special-purpose applications. Many are sold for incorporation into other systems. Increasingly they are carrying out general-purpose functions, because of the development of specially designed peripherals. Prices for basic minicomputer systems are generally less than $25,000.

Microprocessors or minicomputers are differentiated from minicomputers in that they are based upon a semiconductor chip that incorporates all the necessary arithmetic and logic circuitry by means of large-scale integration (LSI). This chip forms the basic building-block around which other circuits, memory modules and a power supply unit may be added to form a microprocessor system. Microcomputers are, and will be increasingly used as an integral part of many new and redesigned products, such as an industrial sewing machine. Used in that manner it may become virtually impossible to identify it as a computer after it has been physically integrated in products of this type.

Small Accounting Computer Systems - These systems are known as electronic accounting machines, office computers, small business computers, electronic billing computers, magnetic record computers, and visible record computers. They differ from conventional accounting machines in that they incorporate some form of memory that provides modest internal processing capabilities. At the present time, they are used almost exclusively for accounting applications, such as accounts payable, accounts receivable and general ledger work, and are operated primarily by means of direct keyboard input. Small accounting computer systems range in price from about $5,000 to $75,000.

Analog and Hybrid Computer Systems - Analog computer systems consist of analog elements (summers, integrators, inverters); control elements and programming elements. In addition, they normally incorporate input and output elements. Programming is undertaken by establishing appropriate connecting paths through plug boards or patch panels. As stand-alone systems, they are mainly used in the engineering faculties of universities, where the modelling of system dynamics is an important function. Prices for analog computer systems range from less than $10,000 to $75,000.

A hybrid computer system is generally regarded as being a combination of an analog computer system and a digital computer system, interfaced by analog-to-digital and digital-to-analog converters. However, any combination of digital and analog elements is also regarded as a hybrid system. With respect to the latter, the digital element is a special-purpose minicomputer. Hybrid systems are most often employed in scientific applications or in controlling industrial processes where the ability to manipulate both discrete and continuous data is required. The price of hybrid systems depends primarily on the combination of equipment employed for a particular task, but typical systems range between $20,000 and $150,000.

Peripheral Devices

For the purposes of this Report, a peripheral is any data processing device other than CPUs and related telecommunications equipment. Stand-alone peripherals, however, are described below under "other equipment." Traditionally, peripherals have been mainly associated with general-purpose digital computer systems, but more recently special peripheral devices have been designed to enhance the power and flexibility of both minicomputer and small accounting computer systems.

Peripheral devices comprise four main types: storage units (magnetic tape, disk, drum) that facilitate the high-density storage of data for convenient access; input/output devices (card, paper-tape reader/punch, printers) that facilitate the input of data to the system, and the extraction of data and/or information from the system; data communications terminals that may be described as remotely-located input/output devices; and data logging and data acquisition units that perform data input functions, some automatically.

Related Telecommunications Equipment

This group of data processing equipment comprises devices that facilitate the interconnection of other data processing devices at remote locations with the central data processing facility. The main devices are multiplexors and concentrators, communications processors and modems.

(Much controversy has surrounded the question of just where the dividing line between the user's data processing equipment and the common carrier's plant and facilities should be drawn. As many of the relevant devices have the aim of increasing the efficiency of data communication, the telephone and telegraph companies decide what is or is not a permissible "foreign attachment", and variances in these decisions may occur among different common carrier jurisdictions. In general, however, the devices referred to are now allowed to be purchased and installed by the user provided that data transmission resale to third parties does not take place. Teletypewriters and teleprinters are regarded in this context as data communications terminals, and are therefore classified under peripheral devices.)

Multiplexors and concentrators are devices used within a data communications network (e.g., a computer system to which several remote terminals are attached) that effectively sub-divide a single communications linkage into a number of logical linkages.

Communications processors are computer systems designed to perform data communications functions, usually within a large data communications network. Frequently, a communications processor is used to control the network, allowing the major computer system with which it is associated to be devoted to the computing tasks at hand. A communications processor may incorporate the functions of multiplexing, line concentration, message switching and varying degrees of message processing by means of programmable software.

Modems are devices that enable data to be transmitted and received over analog communications links. As most of the common carriers' channels are of voice grade, modems are essential interfaces between computers and terminals in data communications networks. At the transmitting end of a circuit, a modem modulates digital pulses into a form acceptable to the communications channel; at the receiving end, another modem demodulates the transmission and restores the data to its original form.

Other Equipment

Data Entry, Preparation and Data Handling Systems and Devices - This classification is intended to cover most of the systems and devices that perform support roles within computer system installations. As such, they are not normally interconnected with the computer systems they serve, and many are incapable of such interconnection. Data entry systems and data preparation devices have as their prime purpose the capturing of source data and the conversion of those data into computer- or machine-readable form. Some of the former systems incorporate minicomputers to perform data editing and audit trail creation, while the latter

devices include card punches and verifiers. Data handling devices are mostly of an electro-mechanical nature designed to perform the sorting, collating, totalling and calculating associated with data cards, and together with card punches and verifiers, are referred to as unit record equipment.

Data Processing Media - Unrecorded data processing media include fixed and removable magnetic disks, disk packs, diskettes, reel-type magnetic tape, magnetic tape cartridges and cassettes, magnetic strips and magnetic strip cards. They are included in this Reference because of their component-like status in certain types of data processing equipment. Although data cards, output forms and other paper products could apply equally under this heading, it is considered that there are no substantive reasons for doing this at this time. Traditionally, the items of concern have been classified for tariff purposes with all types of recording media, including phonograph records and sound recording tape. In certain instances, e.g., magnetic tape cassettes, the physical differences between those for computer use and those for audio-recording are not always outwardly apparent, and while the computer version can be used for audio, the reverse situation often produces less than satisfactory results due to skewness.

Computer Operating Systems Software

Computer operating systems software is provided with most computer systems in order to make them operable. It often includes other software programs within its repertory, such as compilers, sort-merge generators, data conversion routines, and general utility programs. Software akin to computer operating systems is also provided with communications processors.

Manufacturing and Service Parts

This category circumscribes the thousands of parts and components that are used in the manufacture and repair of the immense variety of devices encompassed under the preceding groups. Included here, are parts and components with electrical or electronic functions such as integrated circuits, transistors, resistors, capacitors, amplifiers, cable, display tubes, transformers and electric motors. The non-electrical or non-electronic parts would include gears, cases, frames, spools, cams, pulleys, yokes, blades, shafts, brackets, buttons, lenses, bobbins, print chains, panels, and many other items commonly associated with mechanical and electro-mechanical machinery. Manufacturing and service parts also comprise subassemblies of all the parts and components that fall within this category.

The classes of equipment described above constitute the extent of the equipment under review. With the possible exception of data entry systems, only the first four classes are truly 'data processing systems', and the remaining classes normally form part of such systems. The demarcation lines between classes are not rigid, and certain equipment could equally well be considered in one class as another. The classifications are no more than a convenient way of circumscribing a wide variety of products for analytical purposes.

Typically, a small data processing system might consist of: a central processing unit; a card reader for data input; two disk drives for data storage; and a line printer for information output. A number of card punch/verifying machines would probably be used in support of the system for transcribing source data. In contrast, a large system might include: a central processing unit; a console; one or more card reader/punch devices for data input and output; several magnetic tape and disk drives for data storage; one or more line printers for information output; several data communications terminals for accessing the system from remote locations; and a multiplexer and modems for their operation. A data entry system might also be employed in support of the computer system for transcribing source data.

Systems Units

The products or devices that may be configured to form a particular data processing system are listed below in Table 2.1. This is not intended to be an exhaustive listing but rather an indication of the types of units that are commonly available. Because of the variations in terminology alternate designations are sometimes provided as are notes where appropriate.

Table 2.1: Self-Contained or Integrated Units of a Data Processing System

Type of System Unit / Product or Device Name	Alternate Designation and Notes
Central Processing Unit	
main memory unit	
add-on main memory module	
console	A console is sometimes housed with a CPU and provides for operator interrogation and information by means of a typewriter and/or switches lamps or, possibly, a CRT display.
Miscellaneous Units	These units may be self-contained or may be housed within another device, e.g., a tape control unit within a tape drive. In general, this category represents those units required for the interconnection and integration of a computer system.
control unit	
adapter unit	
power supply unit	
cables, interconnecting	
interface units	
computer clock	
performance monitor	
Peripherals - Storage or memory enhancement	
magnetic tape drive	Also known as transport, handler or unit.
magnetic disk drive	
magnetic drum	
auxiliary memory unit	Also known as mass memory, bulk memory, extended core storage. These devices, while similar to main memory, are designed for the storage rather than the processing of data.

Table 2.1 (Cont.)

Products or Device Name	Alternate Designation and Notes
magnetic strip cell	Also known as data cell.
macro arithmetic processor	
Peripherals - Input/Output	
card reader/punch	
paper tape reader/punch	
printer	
computer output microfilmer	
typewriter	
plotter	These may be flatbed, drum or microfilm types.
optical reader	OCR, MICR, mark-sense types.
Peripherals - Data Communication	
audio response terminal	
batch terminal	
visual display unit	Also known as CRT terminal.
display panel	
graphics terminal	
portable terminal	
printer terminal	
programmable terminal	Also known as intelligent terminal.
punch card terminal	
teller terminal	Also known as banking terminal.
point-of-sale terminal	
credit-checking device	
typewriter terminal	Note: some terminals incorporate multiple features, e.g., CRT display, printer, keyboard, card readers.
teletypewriter, teleprinter terminal	
mark sense terminal	
data logging devices	
data acquisition devices, incl. scanners, sensing units, couplers, etc.	
Related telecommunications equipment	
modem	Also known as data set.
digital data set	
acoustic coupler	
polling unit	
communications processor	Also known as controller.
multiplexor/concentrator	
error detection and correction device	
communications line monitor	
data encryption/decoding device	
Data entry, data preparation and data handling devices	
key-to-magnetic tape recorder	These may be computer-compatible, cartridge or cassette types.

Table 2.1 (Concl.)

Products or Device Name	Alternate Designation and Notes
key-to-disk recorder	
key-to-diskette recorder	
key-to-paper tape recorder	
cartridge, cassette or disk converter	
card punch/verifier	
card reproducer	
card summary punch	
card sorter	
card collator	
card tabulator	
card calculator	
card reader/interpreter	
optical readers	Includes OCR, MICR and mark-sense readers.
data collection devices, incl. badge, card and slide readers	May include keyboards.
data tablet	Normally attached to or associated with a graphics terminal or a CRT display.

Source: Adapted by Tariff Board from various sources.

Manufacturing and Service Parts

(The variety and number of different devices that can form a data processing system are magnified by the parts that constitute these devices. The list that follows portrays a portion of the more common types of parts involved, and is based in large measure on lists of computer parts provided by the Electronic Industries Association of Canada, and by the Society of the Plastics Industry of Canada.)

amplifiers, distribution and main line
amplifiers, multi-taps
amplifiers, video distribution for VDUs
cable, coaxial
cable, coaxial, flatribbon
cable, harness
cable, multi-conductor
cable, paired or multi-paired
capacitors, aluminum, electrolytic
capacitor/resistor networks
capacitors, tantalum electrolytic
circuits, computer logic
circuits, digital, bipolar
circuits, linear, bipolar
connectors, input/output
connectors, memory stack
connectors, power
connectors, printed circuit board
contacts, mercury wetted
converters, data interface
converters, digital to video
data generators
display tubes, data
display tubes, graphic
heat sinks, aluminum
inductors, iron core
keyboards
light-emitting diodes
lugs, terminal
memory sub-systems, core
memory sub-systems, semiconductor
panels, computer back plane
panels, jack
photodiodes
plastic assemblies, tape drive
plastic dust covers

plastic frames, memory core
plastic gears, cases, spools, cams, pulleys, palls, yokes, blades, shafts, brackets, buttons, lenses, bobbins
plastic housings
plastic laminates, circuit board
plastic reels, tap
power supply assemblies
resistor/capacitor networks
resistors, fixed; variable
selectors, sequential
semiconductors, metal oxide
switchers, video, data display
switchers, lighted push-button
switches, stepping
transistors, plastic-encapsulated
wire adapters
wire, hook-up

PRODUCTS OUTSIDE THE SCOPE OF THE REFERENCE

There are a number of other products that are sometimes associated with data processing that have computer like functions, or that have some similarity to computing equipment. These features place them at the borderline between those items of definite concern, and those with no obvious relevance to this Reference. This section considers some of those borderline products, with the twofold objective of limiting the scope of an already wide ranging Reference, and of ensuring that excluded products are noted in order that they remain subject to their current tariff treatment.

Computer-Like Products

Electronic Calculators - Advanced versions of electronic calculators have many of the attributes of computers, including semiconductor memory, addressable registers, and programmability. Peripheral storage devices are now becoming available for attachment to some models of calculators, perhaps portending the interconnectability of other input/output devices. In time, it may well be impossible to make a logical distinction between an "electronic calculator system" and a minicomputer or microprocessor system. For the present, electronic calculators will be excluded from review. If "floppy-disk" units or other storage devices become plug-compatible standards for both electronic calculators and any form of computer, these storage units might then be classified with data processing systems.

Electronic Switching Systems - Inasmuch as an electronic switching system is controlled by what in essence is a computer, the question arises as to whether such a system falls within the scope of this study. The Board concludes that electronic circuit switching systems do not. Circuit switching is the prerogative of the common carriers and is the means of establishing communications paths between the facilities of different subscribers. The electronic switching systems now being increasingly employed for this purpose are not normally available for purchase by users in the regular course of trade, and are considered, for purposes of this Report, to be part of the common carrier's telephone apparatus. Northern Electric's model SP-1 is an example. On the other hand, electronic message switching equipment is included in the study. Message switching is usually carried out over private line networks, and employs communications processors. Communications processors are available for purchase by users and are part of the related telecommunications equipment referred to in this Reference.

Special-Purpose Digital Computers - Many computers, particularly minicomputers and mocroprocessors, are being increasingly used in command and control systems, where they form but one element in a larger device. As a general rule such computers should be considered as parts of the control apparatus in question and outside the scope of this Reference. Until incorporated into control apparatus and on the assumption that they are identifiable as computers, it is felt that they are more appropriately considered as data processing equipment.

Word-Processing Systems - Combinations of electric typewriters and memory devices (usually magnetic tape) are available that permit the user to amend and reproduce a script without the need for onerous retyping. While most word processing systems depend on data processing type structures for the recording, accessing, amending and transcription of a script, these features are considered to be insufficient to justify the inclusion of these systems in this review.

Software

Whether "software" should be included within the scope of this Reference was also discussed in the submissions and at the public sittings. Software can be divided into two kinds; computer operating systems software, and computer applications software. In very general terms, the first kind of software consists of routines and procedures for the efficient and effective operation of the computer system; the second kind consists of the special "programs" required for the solution of the particular problems to which the rapid data processing capabilities of the computer are applied.

With respect to operating systems software, it is an integral part of the operation of most of the large and medium-size computer systems in service today. Actually certain minicomputer systems are now also advertised complete with an operating systems software package. The purpose of this software is the efficient utilization of all of the equipment within the computer system; to that end it controls all hardware devices, programs and data. This executive and supervisory control is particularly necessary when many tasks require processing at the same time, and when the subsequent complexities of allocating the resources of the system are beyond the capacities of human operators.

Operating systems software is, generally speaking, prepared by the computer hardware manufacturer, and is, in most instances, provided by him along with the hardware. The price of the hardware incorporates the price of the operating systems software, i.e., the cost of the software is recovered from the price of the hardware. For these reasons, even though operating systems software is outside the normal meaning of the word "equipment" of the letter of reference, it was deemed to be within the scope of this study.

Applications software, however, was considered to lie outside the scope of this review because it is mostly prepared by users to perform specific tasks on their computer systems. Although it is also provided by software houses, service bureaux and computer systems manufacturers, it is sold or rented to users in the form of software packages to perform general tasks that may be applicable to a wide range of users. When applications software is sold or rented by computer

systems manufacturers, it is a separate transaction, unrelated to, and not a cost component of, the sale or rental of computer hardware. The Board is of the opinion that the inclusion of applications software would have stretched the meaning of "computer - or data processing - and related telecommunications equipment" well beyond what was intended.

Other Products

Furnishings and Fittings - Within a data processing installation there are usually many pieces of equipment that serve to provide or enhance the operating environment. They may be especially designed to fit articles used in data processing, or they may be standard items commonly used in offices and factories. They include desks, tables, trolleys, tape and disk cabinets, racks, non-combustible files, and fire-proof vaults. These items are excluded for review purposes.

Auxiliary or Support Equipment - Items such as forms bursters, forms decollators, output forms reducers and reproducers, and microfilm readers may perform an integral and important function in certain data processing applications. While they may aid in the process, however, their relationship is much more indirect than other support equipment mentioned previously. For this reason, and because of their potential or actual non-data processing usage, they are excluded from this Reference. Also excluded are magnetic tape and disk cleaners.

Environmental Equipment - Air-conditioning equipment, stand-by power generating equipment, and raised flooring are not considered relevant to this review.

Measurement Instruments and Testing Systems - This category covers a large variety of devices, some of which are used to test computer systems and their component units during preventive maintenance, and in the event of system failure. A sophisticated testing system or measurement instrument may incorporate a small processor, but neither these nor other instruments of this nature are considered relevant to this Reference.

CHAPTER III: PRESENT TARIFF STRUCTURES

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CHAPTER III: PRESENT TARIFF STRUCTURES

This chapter studies the Canadian tariff items that are used to classify computing equipment and parts imported into Canada. It attempts to circumscribe all the items used, their nomenclature and their rates of duty. It also discusses the Machinery Program on Remission of Duties Under Tariff Item 42700-1 administered by the Department of Industry, Trade and Commerce,(1) because this item is important for the importation of computing equipment and parts. The chapter also discusses customs valuation procedures with respect to computing equipment and parts. It concludes with a review of the nomenclature pertaining to these commodities in the United States Tariff Schedule and the Brussels Tariff Nomenclature (BTN), and reviews the rates of duty levied on these commodities by other countries.

CANADIAN TARIFF ITEMS AND RELATED CUSTOMS MATTERS

The main purpose of this section is to indicate which tariff items, as far as the Board was able to ascertain, have been used to classify computing equipment and parts, which tariff items are most significant in terms of import values, and the applicable rates of duty. It also illustrates the types of products and parts imported under each relevant tariff item, and conversely, the tariff items under which they are normally classified.

The complexity and variety of computing equipment and parts, and the large number of tariff items under which these goods conceivably could be entered, make it difficult to ascertain just which and how many tariff items have been used to classify them or even to determine whether the same product always enters under the same tariff item. Although evidence can be obtained for a sample period that indicates the entry of this equipment under particular tariff items, it cannot be said that no other items have been used.

Tariff items used to classify computing equipment and parts are also used to classify other commodities. In order to determine to what extent a particular tariff item has been used to classify relevant equipment, a special survey of import documents relating to that tariff item was required.

Much of the analysis of this and other chapters of the Report is based upon the information derived from the Board's survey and analysis of import documents. This information reflects a tendency towards slight understatement where imports (primarily small parts) enter under tariff items which were not encompassed by the Board's import analysis; and on the other hand there is a possibility of some overstatement where, because of difficulties with product descriptions on import documents, the product coverage may have been more liberal than that specified in Table 2.1.

(1) Administered by the Machinery and Equipment Advisory Board, Industry, Trade and Commerce.

On the basis of its surveys of import documents, the Board believes that there are 63 tariff items that are relevant to this Reference. Of the 93 tariff items that came to the Board's attention as being possibly relevant, 30 were found to be outside the scope of this study; these non-relevant items are listed in Appendix B.

Tariff Items Specifically Referred to the Tariff Board

The Minister of Finance requested the Board to study and report on 19 tariff items as they relate to the equipment and parts under review.

Four of the tariff items specifically referred to the Board by the Minister do not, on the basis of the Board's import analysis, pertain to the import of relevant commodities. These are:

		B.P.	M.F.N.	Gen.	G.P.T.
41420-1	Adding machines	Free	$17\frac{1}{2}$ p.c.	25 p.c.	Free
	GATT		15 p.c.		
41425-1	Parts of adding machines	Free	10 p.c.	25 p.c.	Free
44546-1	Apparatus for the receiving and transmitting of photographs, weather maps and charts, by wire; parts of the foregoing	Free	Free	30 p.c.	Free
46241-1	Microfilm reader-printers and parts thereof	Free	Free	10 p.c.	Free

The Board's import analysis also failed to reveal imports of relevant products under tariff items 41430-1, 41435-1, and 44533-1 (for a description of these items see Table 3.1). However, information obtained from the Department of National Revenue indicates that, subsequent to the Board's survey of import documents relating to 1971-72, these items have been used for imports of commodities falling within the scope of this Reference. Specifically, it is understood that some point-of-sale terminals and parts have entered under tariff items 41430-1 and 41435-1, respectively, although other items (41415-1, 42700-1) have also been used to classify these particular devices. It is also understood that tariff item 44533-1 has been used for the entry of certain large visual displays. The Board therefore lacks quantitative information with respect to these three items. In summary, of the 19 tariff items specifically referred, the Board considers that 15 items are relevant. They are listed in Table 3.1.

Of the four non-relevant tariff items, 41420-1 and 41425-1, as currently administered, are being used to classify machines with adding and subtracting functions only. More complex machines, capable of multiplication, division and other functions, are classified elsewhere in the Customs Tariff.

It is conceivable that apparatus classifiable under tariff item 44546-1 could be integrated within a computer system, and as such would be within the scope of this Reference. However, there was no evidence before the Board that such equipment used in conjunction with computers has been imported. An importer of apparatus usually classified under tariff item 44546-1 advised the Board that:

> ... we do not think of item 44546-1 as being associated with 'computers and related telecommunications equipment', and we include in that premise, peripheral or auxiliary equipment.(1)

With regard to tariff item 46241-1, the microfilm reader-printers classifiable under that item do not constitute peripheral or other data processing equipment, and are considered to be outside the scope of this Reference. In Reference 147, the Tariff Board recommended that microfilm readers, reader-printers and parts be classified under proposed tariff item 90.09.(2)

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(1) D. Ward McGill, letter of August 21, 1972, on behalf of Stewart-Warner Corporation of Canada Ltd.

(2) The Tariff Board, Photographic Equipment, Reference No. 147, Ottawa, 1974, p. 314.

Table 3.1: Relevant Tariff Items Specifically Referred to the Tariff Board

Tariff Item	Nomenclature	Rate (p.c.) B.P.	M.F.N.	General	G.P.T.(a)	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971: All Commodities $	EDP Equipment and Parts $	%
41202-1	Printing presses, n.o.p., with an image or printing area of less than 374 square inches; parts of the foregoing	Free	10	15	Free	Printer; data communications terminal; pagewriter interchangeable train cartridge; parts for printers.	3,564,000	1,586,418	44.5
41400-1	Typewriters	Free	20	25	Free	Keyboard device; input/output typewriter; console printer keyboard; non-transmitting typewriter; console typewriter; workstation; communications terminal.	X	X	7.1
	From November 19, 1974 to June 30, 1976	Free	15	25	-				
41405-1	Parts of typewriters	Free	7½	25	Free	parts for typewriters; typehead.	X	X	2.7
	From November 19, 1974 to June 30, 1976	Free	5	25	-				
41415-1	Bookkeeping, calculating and invoicing machines and complete parts thereof, n.o.p.	Free	10	25	Free	Memory block; real-time clock; parts of c.p.u.; arithmetic unit; processor-controller; core storage; main storage frame; logic unit; multi-function module; central storage & input/output control; c.p.u.; electronic billing computer; educational analog computer; power supply.	21,306,000	16,976,949	79.7

Table 3.1: Relevant Tariff Items Specifically Referred to the Tariff Board (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)[(a)] B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971: All Commodities $	EDP Equipment and Parts $	%
41430-1[(b)]	Cash registers	20	20	30	13	-	1,037,000	-	-
41435-1[(b)]	Complete parts of cash registers, when imported by manufacturers of cash registers for use in the manufacture of such registers in their own factories	12½	12½	25	6½	-	125,000	-	-
	GATT		10						
	Note: British countries are entitled to MFN Tariff rates of duty.								
42700-1	Machines, n.o.p., and accessories, attachments, control equipment and tools for use therewith; parts of the foregoing	2½	15	35	2½	Terminals; document transport; disk file; drum storage; operator stations; card data recorder; computer service parts; badge punch; tape-to-card punch; reproducing punch; disk pack; optical reader; card verifier; keyboard; collator; parts for card punch; card sorter; paper tape reader; process control.	197,872,000	33,418,160	16.9
	Except that in the case of the importation into Canada of any goods enumerated in this item, the Governor in Council on the recommendation of the Minister of								

Table 3.1: Relevant Tariff Items Specifically Referred to the Tariff Board (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)[a] B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971: All Commodities $	EDP Equipment and Parts $	%
42700-1 (cont.)	Industry, Trade and Commerce may, whenever he considers that it is in the public interest and that the goods are not available from production in Canada, remit the duty specified in this item applicable to the goods, and subsections 17 (2), (3), (4), (5), and (8) of the Financial Administration Act apply in the case of a remission granted under this provision.					System; circuit board assembly; printer.			
44506-1	Electric telegraph apparatus and complete parts thereof	Free	17½	30	Free	Telecommunications terminals; data transmission terminals; transaction validation terminals; data entry unit; audio response unit; modems; teleprinters; data sets; teletypewriters.	2,837,000	1,105,880	39.0
44508-1	Electric telephone apparatus and complete parts thereof	10	17½	30	10	C.T.M. Controller; voice line; communications unit.	X	X	1.5

Table 3.1: Relevant Tariff Items Specifically Referred to the Tariff Board (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)[a] B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971: All Commodities $	EDP Equipment and Parts $	%
44524-1	Electric apparatus and complete parts thereof, n.o.p.	15	17½	30	11½	Microprocessor; external cable; print buffer; display stations; multiplexer channels; transmission controls; data entry units; switching units; analog output terminals; cartridge reader; parts; line printer; power supply; circuit boards; D/A, A/D converters; T.D. multiplexer; tape control units; disk drive and control unit.	28,478,000	3,741,180	13.1
44532-1	Electrical instruments and apparatus of precision of a class or kind not made in Canada, viz.:- Meters or gauges for indicating and/or recording altitude, amperes, comparisons, capacity, density, depth, distance, electrolysis, flux, force, frequency, humidity, inductance, liquid levels, ohms,					Plotters; analog input module; extender and meter parts; parts for goods classified as electrical instruments and apparatus not made in Canada; telecomputer.	5,717,000	307,715	5.4

Table 3.1: Relevant Tariff Items Specifically Referred to the Tariff Board (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)[a] B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971: All Commodities $	EDP Equipment and Parts $	%
44532-1 (cont.)	operation, power factor, pressure, space, speed, stress, thrust, synchronism, temperature, time, volts, volume, watts, weight; complete parts thereof	Free	15	30	Free				
	GATT		7½						
44533-1[b]	Radio and television apparatus and parts thereof, n.o.p.	Free	15	25	Free	-	53,150,000	-	-
44538-1	Recorders, reproducers and dictation recording and transcribing equipment using magnetizable tape as a recording medium; parts thereof n.o.p.	10	12½	25	8	Magnetic tape units; tape transport; data recorders; tape drives; key-to-tape units; tape casette system; tape cartridges; photocell assembly; key casette terminals.	9,915,000	3,187,293	32.2
44539-1	Tape transport mechanisms; parts thereof	Free	Free	25	Free	Tape transport mechanism; servo motors.	54,000	4,710	8.7

Table 3.1: Relevant Tariff Items Specifically Referred to the Tariff Board (Concl.)

Tariff Item	Nomenclature	Rate (p.c.) B.P.	M.F.N.	General	G.P.T.(a)	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971 All Commodities $	EDP Equipment and Parts $	%
46200-1	Instruments for observation, measurement, experimentation or demonstration in respect of natural phenomena, n.o.p.; photographic, mathematical and optical instruments, n.o.p.; speedometers, cyclometers and pedometers, n.o.p.; parts of all the foregoing	2½	15	30	2½	Optical image unit; display copier; hard copy monitor; parts for goods classified as optical instruments; camera module.	4,473,000	14,029	0.3

X Signifies data omitted for reasons of confidentiality.

(a) General Preferential Tariff rates in effect from 1/7/74 to 30/6/84.
(b) No imports of EDP equipment or parts were recorded during the survey period under tariff items so designated.

Source: Tariff Board survey; Statistics Canada; Department of National Revenue.

Tariff Items Not Specifically Referred to the Tariff Board

During the course of its study, 74 tariff items other than those specifically referred by the Minister came to the attention of the Tariff Board. Of these, 48 were found to be relevant and they are listed in Table 3.2; the balance are included in the listing of non-relevant tariff items in Appendix B.

Of the 48 relevant tariff items not specifically referred to the Board, 21 were not encompassed by the surveys undertaken by the Tariff Board. Without exception, these 21 tariff items relate to the imports of parts, the majority of which are general in nature, used in many products and by many industries. Ball bearings, parts of wire, washers and hinges are typical of the commodities classified under these items. They were brought to the Board's attention by the manufacturers within the industry in their briefs and in their responses to the Tariff Board questionnaire. For the Board to determine the degree of applicability of these items, it would have been necessary to examine the entries from more than 300 commodity classes. The 21 items, therefore, have been declared relevant on the basis of the information supplied by industry, but have been left unsurveyed.

The 27 relevant surveyed tariff items not specifically referred to the Board include 16 items that may be described as containing 'end-use' provisions.(1) These favour a wide range of industries and institutions by providing free or low rates of duties, and are used for the imports of both completed units and parts. The remaining 11 relevant surveyed tariff items not specifically referred to the Board have been used primarily to classify parts of a general nature.

(1) These 16 items are listed in Table 3.3, p. 89, against the sub-heading "All Units".

Table 3.2: Other Relevant Tariff Items

Tariff Item	Nomenclature	Rate (p.c.)[a] B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971[b] All Commodities $	EDP Equipment and Parts $	%
17200-1	Books, pamphlets, and charts printed or published by any government abroad; official financial and business reports and statements issued by companies or associations abroad; books and pamphlets, and replacement pages therefor, for the promotion of religion, medicine, and surgery, the fine arts, law, science, technical training, and the study of languages, not including dictionaries. Scripture and prayer cards, and religious pictures and mottoes, not including frames; books, bound or unbound, which have been actually printed and manufactured more than twelve years; manuscripts; insurance maps; freight rates,					Technical manuals and lists.	8,762,000	(c)	-

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)[a] B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971[b] All Commodities $	EDP Equipment and Parts $	%
17200-1 (cont.)	passenger rates and timetables issued by transportation companies abroad and relating to transportation outside of Canada, in book or in pamphlet form	Free	Free	Free	Free				
17900-1	Labels for cigar boxes, fruits, vegetables, meats, fish, confectionery or other goods or wares; shipping, price or other tags, tickets or labels, and railroad or other tickets, whether lithographed or printed, or partly printed, n.o.p.; for the foregoing not including labels of textile fibres or filaments	17½	20	35	13	Machine identification labels.	347,000	(c)	-
	Tickets issued by railway systems in the British Commonwealth (not including railway systems operating in Canada), shall be exempt from customs duty, when produced in countries entitled to the								

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)[a] B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971[b] All Commodities $	EDP Equipment and Parts $	%
17900-1 (cont.)	benefits of the British Preferential Tariff.								
18010-1	Decalcomania transfers of all kinds, n.o.p.	$12\frac{1}{2}$	$17\frac{1}{2}$	$22\frac{1}{2}$	$11\frac{1}{2}$	Machine decals.	182,000	(c)	-
34000-1	Type, chases, quoins and slugs, for use in printing	Free	10	20	Free	Type and slugs for use in printing.	X	X	1.0
35200-1	Brass and copper nails, tacks, rivets and burrs or washers; bells and gongs, n.o.p.; and manufactures of brass or copper, n.o.p.	$17\frac{1}{2}$	$17\frac{1}{2}$	30	$11\frac{1}{2}$	Brass washers.	6,225,000	(c)	-
35400-1	Manufactures of aluminum, n.o.p.	15	$17\frac{1}{2}$	30	$11\frac{1}{2}$	Aluminum racks, boxes.	X	X	0.1
36800-1	Clocks, time recorders, clock mechanisms and cases but not less than, each	15	25	35 50 cts.	15	Digital time unit; clock.	X	X	*

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)(a) B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971(b) All Commodities $	EDP Equipment and Parts $	%
39000-1	Castings, of iron or steel, in the rough, n.o.p.	15	15	27½	10	Castings, of iron or steel.	1,268,000	78	*
40121-1	Wire of all metals and alloys thereof, n.o.p.; Single, not coated or covered	7½	12½	25	7½	Buss strips.	327,000	(c)	-
40123-1	Wire of all metals and alloys thereof, n.o.p.; Twisted, braided, bunched or otherwise conjoined, whether or not reinforced with steel, coated or covered or not, including cable, rope and strand	12½	17½	25	11½	Wire; cables.	2,385,000	(c)	-
41023-1	Machinery and apparatus for use in the processing, smelting or or refining of ores, metals or minerals, namely: Agitators; Amalgam cleaners; Automatic ore samplers; Fans, blowers or compressors, of iron or					Electrical control equipment for metallurgical process; parts; output system coupler.	1,560,000	7,738	0.5

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)[a] B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971[b] All Commodities $	EDP Equipment and Parts $	%
41023-1 (cont.)	steel; Classifiers; Converting apparatus for metallurgical processes; Feeders, mechanical; Filters; Flotation machines, flotation cells, and oil feeders and regent feeders therefor;								
	Furnace slag trucks and slag pots; Pyrometers; Retorts; Screens, including oscillating; revolving, shaking, stationary, travelling and vibrating screens, and grizzlies; Separators, including jigs and magnetic or electric separators and magnetic pulleys; Slime or concentrating tables; Thickeners; Chemical conversion, extraction, reduction or recovery apparatus								

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)[a] B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971[b] All Commodities $	EDP Equipment and Parts $	%
41023-1 (cont.)	for use in metallurgical operations; Machinery and apparatus for use in the refining of metals or in roasting or smelting or the production of anodes, cathodes, blocks, slabs, pigs or ingots in such processes; Machinery and apparatus for use in washing, screening, drying or dry cleaning coal: Of a class or kind not made in Canada, parts thereof	Free	Free	Free	Free				
41201-1	Printing presses, n.o.p., with an image or printing area of 374 square inches or larger; mechanical deliveries or conveyors for use with such presses; parts of the foregoing	Free	Free	15	Free	Printer; parts.	3,211,000	7,210	0.2

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)[a] B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971[b] All Commodities $	EDP Equipment and Parts $	%
41205-1	Machines and apparatus, excluding those provided for in tariff item 41210-1, for use exclusively by, and in their capacities as printers, lithographers, bookbinders, paper or foil converters, manufacturers of stereotypes, electrotypes and printing plates or rolls, or manufacturers of articles made from paper, cardboard or foil, namely:-					Parts; buffer micro switch.	3,329,000	420	*
	Machines and apparatus for making matrices, stereotypes, electrotypes or printing plates of any kind;								
	Machines and apparatus for the preparation of plates by graining, grinding, polishing or sensitizing;								

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)[a] B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971[b] All Commodities $	EDP Equipment and Parts $	%
41205-1 (cont.)	Machines and apparatus, including cameras and camera equipment, lenses, prisms, camera and printing lamps, screens and vacuum frames, for transferring imagery to sensitized paper, film, plates or rolls for use in printing;								
	Machines and apparatus for slitting, winding or rewinding, having a roll width of less than seventy-two inches;								
	Gun and mould apparatus for making press rollers;								
	Machines and apparatus for addressing or wrapping newspapers, magazines, periodicals, pamphlets and catalogues;								
	Machines and apparatus for bookbinding, box-covering, bronz-								

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)[a] B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971[b] All Commodities $	EDP Equipment and Parts $	%
41205-1 (cont.)	ing, bundling, carbon coating, counting paper, cardboard or foil, creasing, cutting, drilling, dusting, embossing or producing embossed or engraved effects, eyeletting, flocking, folding, gathering, glueing, gumming, inserting, jogging, looping, metal mounting, numbering, pasting, patching, perforating, punching, reinforcing, ruling, scoring, sewing, sheet feeding, sheet piling, spraying for anti-offset, stamping, staying, stitching, stripping, tube-making, tying, varnishing, or waxing;								
	Parts of all the foregoing	Free	Free	15	Free				

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)[a] B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971[b] All Commodities $	EDP Equipment and Parts $	%
41210-1	Machines and apparatus for use in the manufacture of manifold business forms, namely:- Rotary web fed rubber plate and offset printing presses, and printing units therefor; Feed-in units; Punching units; Slitting units; Perforating units; Winders or rewinders; Folders; Sheet cutting and piling units; Hot carbonizing units; Continuous forms collators; Snap set collators; Continuous forms interleavers; Crimp-lock and slitting machines; Stitchers; Carbon paper processors; Parts of all the foregoing	Free	10	15	Free	H. R. Printer.	450,000	21,370	4.7

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)[a]				Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971[b]		
		B.P.	M.F.N.	General	G.P.T.		All Commodities $	EDP Equipment and Parts $	%
41215-1	Machines and apparatus designed for typecasting, typesetting including phototypesetting, or for producing justified copy; machines and apparatus designed for creating or translating signals, on tape or wire or other media, for programming the automatic operation of the foregoing; typemaking accessories, n.o.p.; parts of all the foregoing; stereotypers' blankers or blanketing	Free	Free	15	Free	Typewriter composer; statistical machine; punch for auto tape keyboard; keyboards.	X	X	0.7

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)[a] B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971[b] All Commodities $	EDP Equipment and Parts $	%
41220-1	Articles and materials which enter into the construction and form part of the machines and apparatus entitled to entry under tariff items 41201-1, 41205-1 and 41215-1, when for use in the manufacture of such machines, apparatus and parts thereof	Free	Free	15	Free	Printer-keyboard; printer; cost of repairs; EWS control.	X	X	24.4
41305-1	Machinery and apparatus, of a class or kind not made in Canada, and parts thereof, for preparing, manufacturing, testing or finishing yarns, cordage, and fabrics mades from textile fibres or from paper, imported for use exclusively by manufacturers and scholastic or charitable institutions in such processes only	Free	Free	10	Free	Kollmorgen colour system tristimulus data processor, combined with process colour controller and formula.	10,449,000	7,726	0.1

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)[a] B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971[b] All Commodities $	EDP Equipment and Parts $	%
42726-1	Ball and roller bearings of a class or kind not made in Canada, n.o.p.; parts thereof	Free	Free	35	Free	Bearings, thrust type; ball bearings.	3,648,000	(c)	-
42729-1	Ball and roller bearings, n.o.p.; parts thereof	Free	15	35	Free	Bearings, ball & roller.	2,819,000	(c)	-
43000-1	Nuts and bolts with or without threads, washers, rivets, of iron or steel, coated or not, n.o.p.; nut and bolt blanks, of iron and steel	7½	17½	30	7½	Bolts; nuts; washers; rivets.	2,835,000	(c)	-
43005-1	Hinges and butts, of iron or steel, coated or not, n.o.p.; hinge and butt blanks, or iron or steel	5	17½	30	5	Hinges.	538,000	(c)	-

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.) B.P.	M.F.N.	General	G.P.T.[a]	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971[b] All Commodities $	EDP Equipment and Parts $	%
43010-1	Screws, of iron or steel, coated or not	15	17½	30	11½	Screws, machine.	1,949,000	(c)	-
43155-1	Photogrammetric instruments and equipment for use in the interpretation of photographs and in the preparation of maps and plans from photographs, including the following: stereoscopes, binoculars for use with stereoscopes, parallax bars, height finders, contour finders, sketchmasters, slotted template equipment and accessories for use with any of the foregoing; stereoscopic plotting instruments and equipment of either optical-mechanical or projector type, including such accessories as plotting and tracing tables whether electrically, mechanically					Digital computer.	X	X	15.8

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)(a) B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971(b) All Commodities $	EDP Equipment and Parts $	%
43155-1 (cont.)	or remotely operated, optical instruments for preparing dia-positive plates, voltage regulators and electrical trans-formers, cooling systems, lamps spectacles, filters, height guages, principal point selectors and other components for use with the foregoing equipment; all the foregoing of a class or kind not made in Canada and parts and fitted cases for any of the foregoing	Free	Free	20	Free				
44022-1	Manufacturers of iron, brass or other metal, of a class or kind not made in Canada, for use exclusively in the construction or equipment of ships or vessels, under regulations prescribed by the Minister	Free	Free	Free	Free	Sonar Computer electronic system; digital converter.	5,468,000	192,916	3.5

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)[a] B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971[b] All Commodities $	EDP Equipment and Parts $	%
44051-1	Parts of aircraft, n.o.p.; When of types or sizes not made in Canada	Free	Free	27½	Free	Airborne computer; aircraft programmer; parts.	X	X	0.1
44059-1	Auxiliary power units; Batteries; Bolts, cooks, cotter pins, eyelets, nuts, pins, rivets, screws, turnbuckles and clevis, washers; Brakes, with related operating gear; Carburettors; Direct or inertia starters with or without related operating gear; Distributors; De-icing and anti-icing equipment; Electric generators; Electric lamps; Exhaust gas analyzers; Fittings and couplings; Fuel pressure warning devices; Forgings and castings; Hingers; Hydraulic jacks;	Free	Free	27½	Free	Micro computers; aircraft instrument computers; flight log computer; computer parts for airborne doppler equipment.	X	X	6.1

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)[a] B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971[b] All Commodities $	EDP Equipment and Parts $	%
44059-1 (cont.)	Hydraulic pumps; Ignition coils; Instruments; Landing and navigation lights; Magnetos; Oil coolers; Pressure fire extinguishers; Primer pumps; Propellers and helicopter rotors; Radio for navigation and air traffic communication; Seats; Shapes or sections, roller, drawn or extruded, and bars, rods, rubes, plate, sheet and strip, of any metal or alloy thereof; Spark plugs; Swaged wires and tie rods; Tires and tire inner tubes; Vacuum pumps with related operating gear; Voltage control boxes;								

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)(a) B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971(b) All Commodities $	EDP Equipment and Parts $	%
44059-1 (cont.)	Wheels; Parts of all the foregoing;								
	All of the foregoing when of types or sizes not made in Canada and for use in aircraft, aircraft engines, airborne aircraft equipment, or parts or aircraft, aircraft engines, or airborne aircraft equipment	Free	Free	$27\frac{1}{2}$	Free				
44504-1	Electric arc lamps and incandescent electric light lamps, n.o.p.	15	20	30	13	Incandescent electric light lamps; computer service parts.	2,209,000	(c)	-
	from November 19, 1974 to June 30, 1976	15	15	30	-				
44514-1	Electric dynamos or generators and transformers, and complete parts thereof, n.o.p.	15	15	$37\frac{1}{2}$	10	Transformers; E.P. generator.	11,485,000	(c)	-
44516-1	Electric motors and complete parts thereof, n.o.p.	15	15	$37\frac{1}{2}$	10	Electric motors; capacitors.	7,292,000	(c)	-

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)[(a)] B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971[(b)] All Commodities $	EDP Equipment and Parts $	%
44518-1	Electric insulators of all kinds, n.o.p., and complete parts thereof	15	15	27½	10	Electric insulators	965,000	(c)	-
44542-1	Electron tubes, except X-ray tubes; Bases, beaded assemblies, cages, guns, mounts, stems and wirewound grids, all for use in the manufacture of electron tubes, except X-ray tubes	Free	15	25	-	Electron tubes, cathode ray tubes.	4,298,000	1,940	0.1
44544-1	Transistors and other semiconductor devices; parts thereof	Free	15	25	Free	Diodes; resistors, transistors; components; other semiconductor devices.	14,809,000	644,924	4.4
44553-1	Parts for use in the manufacture of recorders and reproducers using magnetizable tape as a recording medium, but not including any of the following: resistors, whether fixed or variable, capacitors inductors, transformers, terminal boards, jacks, connectors,					Parts for key-to-tape units; nuts; seals; washers; covers; magnetic heads; chassis; rubber stoppers; electric motors; metal stampings; gaskets; ball bearings.	X	X	72.1

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)(a)				Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971(b)		
		B.P.	M.F.N.	General	G.P.T.		All Commodities $	EDP Equipment and Parts $	%
44553-1 (cont.)	switches, loudspeakers, printer circuit boards, indicator lights, electron tubes, transistors or other semiconductor devices, or assemblies incorporating any of the foregoing	Free	Free	25	Free				
44580-1	Integrated circuits for use in the manufacture of numerical controls for machine tools	Free	Free	25	Free	ICs (integrated circuits).	8,000	5,504	68.8
	(Expires October 31, 1978)								
44603-1	Manufactures, articles or wares, of iron or steel or of which iron or steel or both are the component materials of chief value, n.o.p.	10	17½	35	10	Racks; connectors; lugs capstans; voltage chain; tracks.	36,574,000	14,746	*

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)[a] B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971[b] All Commodities $	EDP Equipment and Parts $	%
45116-1	Pins manufactured from wire of any metal; n.o.p.	15	20	30	13	Computer service parts.	156,000	(c)	-
	From November 19, 1974 to June 30, 1976	15	15	30	-				
46115-1	Automatic scales or weighing machines, of a class or kind not made in Canada, and complete parts of the foregoing for use in Canadian manufactures	Free	Free	Free	Free	Betameter systems; sensors scanners; automatic scales.	X	X	39.9
46500-1	Signs of any material other than paper, framed or not; letters and numerals of any material other than paper	10	25	30	10	Nameplates.	359,000	(c)	-
	GATT		20						
47100-1	Belt pulleys of all kinds, n.o.p. for power transmission	15	15	27½	10	Belt pulley; computer service parts.	306,000	(c)	-

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)[a] B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971[b] All Commodities $	EDP Equipment and Parts $	%
49103-1[d]	Machinery and apparatus for use in exploratory or discovery work in connection with oil or natural gas wells or for the development, maintenance, testing, depletion or production of such wells up to and including the wellhead assembly or surface oil pumping unit; well-drilling machinery and apparatus for use in the exploration, discovery, development or operation of potash or rock salt deposits; these provisions shall not include automotive vehicles or chassis on which the machinery and apparatus are mounted:								
	All other machinery and apparatus, and parts thereof;								

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)[a] B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971[b] All Commodities $	EDP Equipment and Parts $	%
49103-1[d]	Parts of goods enumerated in item 49103-1:								
49105-1	Of a class or kind not made in Canada	Free	Free	Free	Free	Control logic; recorder for digitizer; cyclic channel with cables & software documentation; fans; relays; circuit boards; digital field recording system.	6,030,000	23,982	0.4
49210-1	Machinery and apparatus for use in the distillation or recovery of products from natural gas:					Step sequence timer-controller.	825,000	13,930	1.7
	Of a class or kind made in Canada; parts thereof	5	15	25	5				

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)[a] B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971[b] All Commodities $	EDP Equipment and Parts $	%
49400-1	Manufactures of corkwood or cork bark, n.o.p., including strips, shives, shells and washers of cork	Free	Free	20	Free	Cork gaskets.	202,000	(c)	-
50600-1	Manufactures of wood, n.o.p.	15	15	25	10	Boards.	X	X	*
51902-1	House, office, cabinet or store furniture of wood, iron or other material, and parts thereof, not to include forgings, castings, and stampings of metal, in the rough:					Equipment rack; cabinets.	X	X	*
	In chief part by value of metal	15	17½	45	11½				
61000-1	Belting, n.o.p., not including single-ply belting wholly of textile fibres	7½	20	27½	7½	Belting.	1,789,000	(c)	-
61800-1	Rubber cement and all manufactures of rubber and gutta percha, n.o.p.	15	17½	27½	11½	Rubber parts.	5,138,000	(c)	-

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)(a) B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971(b) All Commodities $	EDP Equipment and Parts $	%
69605-1	Scientific apparatus (and ancillary equipment thereto), utensils, instruments, and preparations, including boxes and bottles containing them; Glassware for laboratory or scientific uses; Maps, charts, motion picture films, filmstrips, microfilms, slides and other photographic reproductions and pictorial illustrations; Pamphlets and magazines; Reproductions of works of art; Sound recordings and video tape recordings; Stencils and cards specially designed for the preparation of library index cards; Models, static or moving; Animals as research					Computers; disc memories; tape drives; printers, teletypewriters; electronic instruments; components; EDP system; card punch; digital recorder; power supply, analog/hybrid computer.	19,961,000	3,005,420	15.1

Table 3.2: Other Relevant Tariff Items (Cont.)

Tariff Item	Nomenclature	Rate (p.c.)[a] B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971[b] All Commodities $	EDP Equipment and Parts $	%
69605-1 (cont.)	or experimental subjects; Living plants, seeds, cuttings, buds, scions, tubers, bulbs and root-stock; Utensils, instruments and other apparatus not otherwise enumerated in this item, of a class of kind not made in Canada, for use directly in teaching or research; Mechanical equipment not otherwise enumerated in this item, when of a class or kind not made in Canada; Parts of all the foregoing. All the foregoing when for the use of any society or institution incorporated or established solely for religious, educational, scientific or literary purposes, or for the encouragement of the fine								

Table 3.2: Other Relevant Tariff Items (Concl.)

Tariff Item	Nomenclature	Rate (p.c.)(a) B.P.	M.F.N.	General	G.P.T.	Representative EDP Equipment and Parts Reported as Entered	Imports during Two Months, 1971(b) All Commodities $	EDP Equipment and Parts $	%
69605-1 (cont.)	arts, (namely architecture, sculpture, painting, engraving and music), or for the use of any public hospital, public library, public museum, university, college, academy, school or seminary of learning in Canada and not for sale or rental unless to those mentioned herein, under such regulations as the Minister may prescribe	Free	Free	Free	Free				
69610-1	Materials and articles for use exclusively in the manufacture of the goods enumerated in tariff item 69605-1	Free	Free	Free	Free	Accoustic current meters; transistors; materials and articles.	X	X	*

X Signifies data omitted for reasons of confidentiality.

(a) General Preferential Tariff rates in effect from 1/7/74 to 30/6/84.
(b) Except for tariff items 44542-1, 44544-1 and 44580-1, which were the subject of a special survey.
(c) Tariff item not encompassed by Tariff Board survey.
(d) Tariff item 49103-1 is not relevant, but it prescribes the nomenclaure for item 49105-1.

Source: Tariff Board survey; Statistics Canada; Department of National Revenue.

Nomenclature

An examination of the large number of relevant tariff items listed in Tables 3.1 and 3.2, and the products and parts classified thereunder, raises several points concerning the suitability of the nomenclature.

It is apparent that many types of equipment may enter individually under as many as five different tariff items; additionally, they may enter under one or more of the 16 end-use items. For example, a printer may be entered under tariff items 41202-1 (printing presses, n.o.p.), 41400-1 (typewriters), 41415-1 (bookkeeping, calculating and invoicing machines), 42700-1 (machines, n.o.p.) and 44506-1 (electric telegraph apparatus); thus, there is wide scope for classifying products having at least the same functional characteristics. This point is brought out more clearly by Table 3.3, where the products identified in Chapter II are shown together with the tariff items under which they are usually classified.

Certain tariff items have been used to classify a variety of products, with one or two of the products not entirely out of line with the nomenclature of the item, but with little or any relationship to the other products in that tariff item. An example is to be found in tariff item 41400-1 (typewriters), which, according to the Board's import analysis, has been used for entry of the following products: keyboard devices; input/output typewriters; console printer keyboards; non-transmitting typewriters; console typewriters; work stations; and communications terminals.

It has been noted previously that 16 relevant tariff items contain end-use provisions. None of these items contains nomenclature that refers specifically to computing equipment. They encompass these products through the use of such terms as: "machinery and apparatus", "instruments", "equipment", "scientific apparatus", and "mechanical equipment". Apart from tariff item 69605-1, the Tariff Board survey revealed that only a limited range of computing equipment was reported as entered under these end-use items, but it is quite conceivable that they have been, or could be applied to many types of computing equipment and parts. These items are listed in Table 3.3 as being relevant to all types of computing equipment.

The current situation is even more complicated with respect to materials and parts of and for computing equipment. Some materials and parts enter under eo nomine tariff items such as 42729-1 - ball and roller bearings, and 43000-1 - nuts and bolts. Of course, imports under such items are destined for many kinds of equipment other than computing equipment. Most of the relevant tariff items used to classify completed units of computing equipment are also used for parts because their nomenclature contains a parts provision. In other words most of the 63 relevant tariff items are used for entering parts of computing equipment.

In an over-all sense, the nomenclature of the tariff items used to classify computing equipment and parts falls far short of providing an accurate description for most of the equipment relevant to this study. All of these tariff items and their nomenclatures were established well before the advent of electronics and computing equipment; consequently, there is not a single tariff item that pertains only to computing equipment and parts. These factors substantiate the criticisms made by the industry that were noted in Chapter I to the effect that the present tariff nomenclature is inadequate in its treatment of computing equipment and parts.

Table 3.3: Tariff Items Under Which Computing Equipment is Usually Classified, by Unit of Equipment

Type of System Unit Product or Device Name	Usual Tariff Item Classification
All Units[a]	41023-1, 41205-1, 41210-1, 41215-1, 41220-1[b], 41305-1, 43155-1, 44022-1, 44059-1, 44553-1[b], 44580-1[b], 46115-1, 49105-1, 49210-1, 69605-1, 69610-1[b].
Mainframes	
central processing unit	41415-1, 44524-1.
main memory unit	41415-1, 44524-1.
add-on main memory module	41415-1, 44524-1.
console	41415-1, 44524-1, 41400-1.
Peripherals	
Miscellaneous Units	
control unit	44524-1, 42700-1, 41415-1, 44506-1.
adapter unit	42700-1, 44524-1, 44506-1.
power supply unit	44524-1, 42700-1.
cables, interconnecting	44524-1
interface unit	44524-1, 41415-1.
computer clock	36800-1, 41415-1, 44532-1.
Storage or Memory Enhancement	
magnetic tape drive	44538-1, 42700-1.
magnetic disk drive	42700-1
magnetic drum	42700-1
auxiliary memory unit	41415-1, 42700-1.
magnetic strip cell	42700-1
macro arithmetic processor	41415-1
Input/Output	
card reader/punch	42700-1, 41415-1, 44524-1.
paper tape reader/punch	42700-1, 44524-1.
printer	41202-1, 42700-1, 41415-1, 44506-1 41400-1.
computer output microfilmer	46200-1
telewriter	41400-1
plotter	44532-1
optical reader	41415-1, 42700-1, 44524-1.
Data Communication	
audio response terminal	44506-1
batch terminal	44524-1
visual display unit	44524-1, 41400-1.
display panel	44524-1, 44533-1.
graphics terminal	44524-1
portable terminal	44506-1
printer terminal	41202-1, 42700-1, 41400-1.
programmable terminal	42700-1, 44506-1.
punch card terminal	42700-1, 44524-1.
teller terminal	41415-1, 41202-1.
point-of-sale terminal	41415-1, 42700-1, 41430-1.
credit-checking device	44506-1, 42700-1.

Table 3.3 (Concl.)

Type of System Unit Product or Device Name	Usual Tariff Item Classification
Peripherals (Cont.)	
Data Communication (Cont.)	
typewriter terminal	41400-1, 42700-1, 44524-1.
teletypewriter, teleprinter	44506-1, 42700-1.
mark sense terminal	44524-1, 42700-1.
data logging devices	44532-1
data acquisition devices incl. scanners, sensing units, couplers	44524-1
Data Entry, Data Preparation and Data Handling Devices	
key-to magnetic tape recorder	44538-1, 44524-1, 42700-1.
key-to disk recorder	44538-1, 42700-1.
key-to-diskette recorder	44538-1, 42700-1.
key-to-paper tape recorder	42700-1
cartridge, cassette or disk converter	44538-1
card punch/verifier	42700-1
card sorter	42700-1
card reproducer	42700-1
card collator	42700-1
card summary punch	42700-1
card tabulator	42700-1
card calculator	42700-1
card reader/interpreter	42700-1
optical readers	46200-1, 42700-1.
data collection devices incl. badge, card and slide readers	44524-1
data tablet	44524-1
Related Telecommunications Equipment	
modem	44506-1, 44524-1.
digital data set	44506-1
acoustic coupler	44506-1, 44524-1.
polling unit	44524-1, 44508-1, 44506-1.
communications processor	41415-1, 44524-1, 42700-1, 44508-1.
multiplexer/concentrator	44524-1
error detection and correction device	44508-1, 44506-1, 44524-1.
communications line monitor	44508-1, 44506-1.
data encryption/decoding device	44524-1, 44508-1, 44506-1.

(a) All units denote those devices that are appropriate to the end-use specified in the end-use tariff items. A card collator, for example, would be an inappropriate device to be entered under tariff item 44059-1, for use on aircraft.

(b) End-use parts tariff items.

Source: Tariff Board survey; Industry submissions; Industry responses to Tariff Board questionnaire.

Imports of Computing Equipment by Tariff Item

The importance of the 63 relevant tariff items used for classifying computing equipment and parts varies considerably. The last column of Tables 3.1 and 3.2 provides the degree of applicability of each of the 36 relevant tariff items that have been surveyed; the 15 items with more than 5 per cent of their imports comprising computing equipment and parts are listed in Table 3.4. It can be seen that tariff item 41415-1 has the highest degree of applicability, with 79.7 per cent of all imports under this item consisting of the products under review. The remaining enumerated items are progressively less applicable, ranging from 72.1 per cent to 5.4 per cent. The 21 other non-specified tariff items have a very low degree of applicability, averaging less than 1 per cent. This low figure would probably apply equally to the 27 tariff items that were not surveyed.

Table 3.4: Percentage Relationship of Value of Imports Computing Equipment and Parts to All Commodities, Two Months, 1971, by Tariff Item

Tariff Item	Computing Equipment and Parts	All Commodities	Computing Equipment and Parts as % of All Commodities
	$	$	%
41415-1	16,976,949	21,306,000	79.7
44553-1	X	X	72.1
41202-1	1,586,418	3,564,000	44.5
46115-1	X	X	39.9
44506-1	1,105,880	2,837,000	39.0
44538-1	3,187,293	9,915,000	32.2
41220-1	X	X	24.4
42700-1	33,418,160	197,872,000	16.9
43155-1	X	X	15.8
69605-1	3,005,420	19,961,000	15.1
44524-1	3,741,180	28,478,000	13.1
44539-1	4,710	54,000	8.7
41400-1	X	X	7.1
44059-1	X	X	6.1
44532-1	307,715	5,717,000	5.4
Others (21)	444,657	104,170,000	0.4
Total	65,261,368	412,249,000	15.8

X Signifies data omitted for reasons of confidentiality.

Tariff item 44580-1 (integrated circuits) had a high degree of applicability (see Table 3.2 and Note 2) but was not in existence at the time of this survey.

Source: Tariff Board survey; Statistics Canada.

The above figures substantiate the finding arrived at previously that the nomenclature of each of the 63 relevant tariff items does not coincide completely and exclusively with the product descriptions set forth in Chapter II. It is clear that each item has a nomenclature, a description of goods, which permits the entry of numerous commodities other than those relevant to this Reference. Even tariff item 41415-1, with almost 80 per cent of its imports comprising computing equipment and parts, lacks a nomenclature which relates it precisely and directly to the relevant products.

Although imports of computing equipment under a specific tariff item may represent only a small proportion of all commodities imported under that item, such imports may nevertheless account for a substantial proportion of the total imports of computing equipment. For example, imports of computing equipment under tariff item 42700-1 represent less than 17 per cent of all commodities imported under that item, but account for over 51 per cent of the value of computing equipment and parts imported during the period. Chart 3-1 compares the value and percentage distribution of the imports of computing equipment and parts by main tariff items. The chart shows that imports under two tariff items, 42700-1 and 41415-1, comprised more than three quarters of all imports of computing equipment and parts during the survey period. Eight of the 36 tariff items included in Table 3.4 accounted for 98 per cent of all imports of computing equipment and parts, with the remaining 28 items accounting for 2 per cent of the total. It is considered that the addition of the value of imports from unsurveyed tariff items to the total would leave the distribution of Chart 3-1 virtually unchanged.

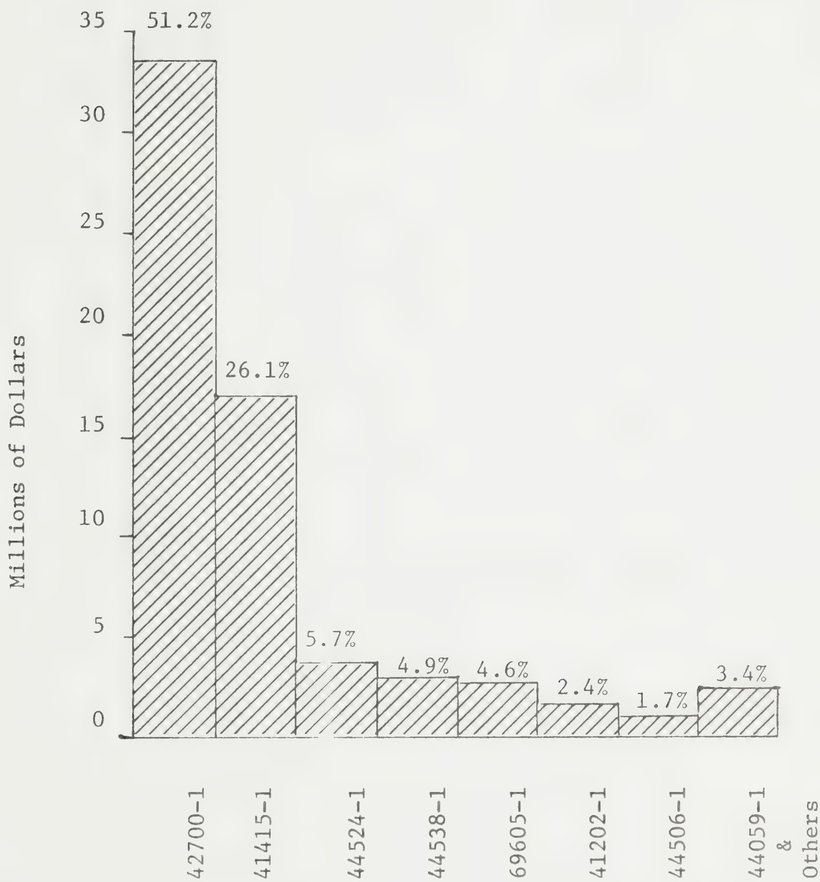
Rates of Duty

Each of the 63 relevant tariff items has four tariffs or tariff rates: the British Preferential (B.P.) Tariff for imports originating in countries which are present or former members of the British Commonwealth of Nations; the Most-Favoured-Nation (M.F.N.) Tariff for imports from countries with whom Canada has a trade agreement; the General Preferential Tariff (G.P.T.) for imports mostly from lesser-developed countries which were accorded this special status with effect from July 1, 1974; and the General Tariff for imports from countries other than those covered by the three other tariffs. At the time of the Tariff Board survey, the G.P.T. had not been adopted and there were no imports of computing equipment and parts under the General Tariff. The following discussion on rates of duty, therefore, will be confined primarily to the M.F.N. and B.P. Tariffs, and particularly to the former, as most of the imports enter under that Tariff.

The rates of duty of the 63 relevant tariff items under which computing equipment and parts are classified vary considerably for both the B.P. and M.F.N. Tariffs. The B.P. rates of duty range from free to 20 p.c., and the M.F.N. rates of duty range from free to 25 p.c. Chart 3-2 illustrates that there are more tariff items at the free rate (32, B.P., 20, M.F.N.), than at any other rate of duty. The next most common rate of duty is 15 p.c., with 14 items under the B.P. Tariff and 13 items under the M.F.N. Tariff. No relevant tariff item carries an M.F.N. rate of duty of either 2½ p.c.

Chart 3-1

VALUE AND PERCENTAL DISTRIBUTION OF IMPORTS OF COMUTING EQUIPMENT AND PARTS BY TARIFF ITEM.



Source: Table 3.5.

or 5 p.c. The majority of relevant tariff items are clustered around three rate levels: the free rate, with a combination of 52 B.P. and M.F.N. Tariffs; and the 15 p.c. - 17½ p.c. rates, with a combination of 41 tariffs. This does not imply that the bulk of relevant commodities is imported at these tariff rate levels, but simply that 93 of the 126 possible tariff rates (two tariff rates each for 63 relevant tariff items) have nominal rates of duty at those levels.

The Value of Imports by Rates of Duty

The value of imports for the period of the Tariff Board survey amounted to $65,261,368. The amount that entered under the B.P. Tariff was $2,942,272 or 4.5 per cent, and the amount that entered under the M.F.N. Tariff was $62,319,096 or 95.5 per cent. These figures demonstrate that the preponderance of computing equipment and parts imports originates in countries accorded M.F.N. Tariff status. The characteristics of the imports are discussed more fully in the context of international trade in Chapter VII.

An analysis of the value of imports of computing equipment and parts indicates that $31,391,657 or 48.1 per cent entered at a 15 p.c. rate of duty, and constituted the largest value of imports. The second largest value of imports, $17,943,626 or 27.5 per cent, entered at a 10 p.c. rate of duty. Thus, almost three quarters of all imports entered at a rate of either 10 or 15 p.c. The third largest value, $5,221,187 or 8 per cent, entered free of duty. In certain instances, these values of imports are in contrast to the clustering of the nominal rates of duty, where it was shown that the largest proportion of applicable tariffs were free of duty. The value of imports by rates of duty is illustrated in Chart 3-3, and the details by tariff item are presented in Table 3.5.

The average rate of duty payable on all imports of computing equipment and parts for the survey period was 11.9 per cent; on imports of $65.3 million the duty payable amounted to $7.7 million. The average weighted rates of duty payable were 2.3 p.c. under the B.P. Tariff, and 12.3 p.c. under the M.F.N. Tariff. The amount of duty actually collected, however, is considerably less than $7.7 million because of remission of duties on imports under tariff item 42700-1. Duties on imports are remitted under this item when the goods in question "are not available from production in Canada."(1) The value of imports of computing equipment and parts on which duties were remitted amounted to $14.3 million during the survey period, and the amount of duty remitted was nearly $2.0 million. Authorization for duty remission for this equipment is most often obtained prior to importation; consequently, the remission of duties is largely effected by the non-payment of duties payable. The remission of duties reduced the amount of duty paid to $5.8 million, or a weighted average rate of 8.9 p.c. After allowance is made for duties remitted, the weighted average rates of duty paid were 1.1 p.c. under the B.P. Tariff, and 9.2 p.c. under the M.F.N. Tariff. These adjustments for the remission of duties are shown at the end of Table 3.5. The adjustments, however, do not take into account those duties remitted after importation. The Board believes that these were not significant, but they would, of course, further reduce by a slight margin the weighted average rate of duty of 8.9 p.c., if they were to be applied.

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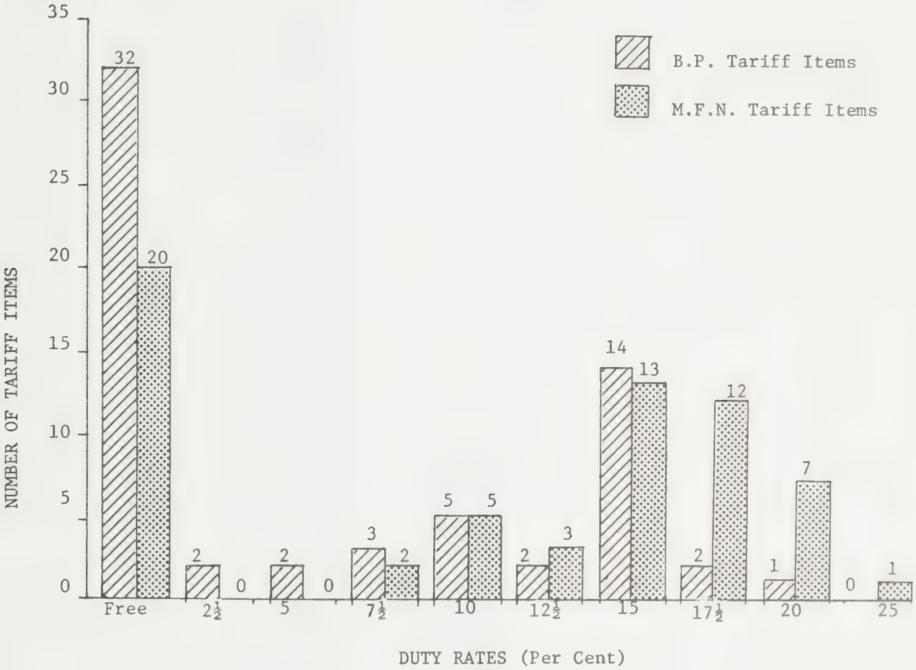
(1) A more detailed discussion of tariff item 42700-1 is to be found on p. 103.

Chart 3-2

DISTRIBUTION OF RELEVANT TARIFF ITEMS BY NOMINAL DUTY RATES

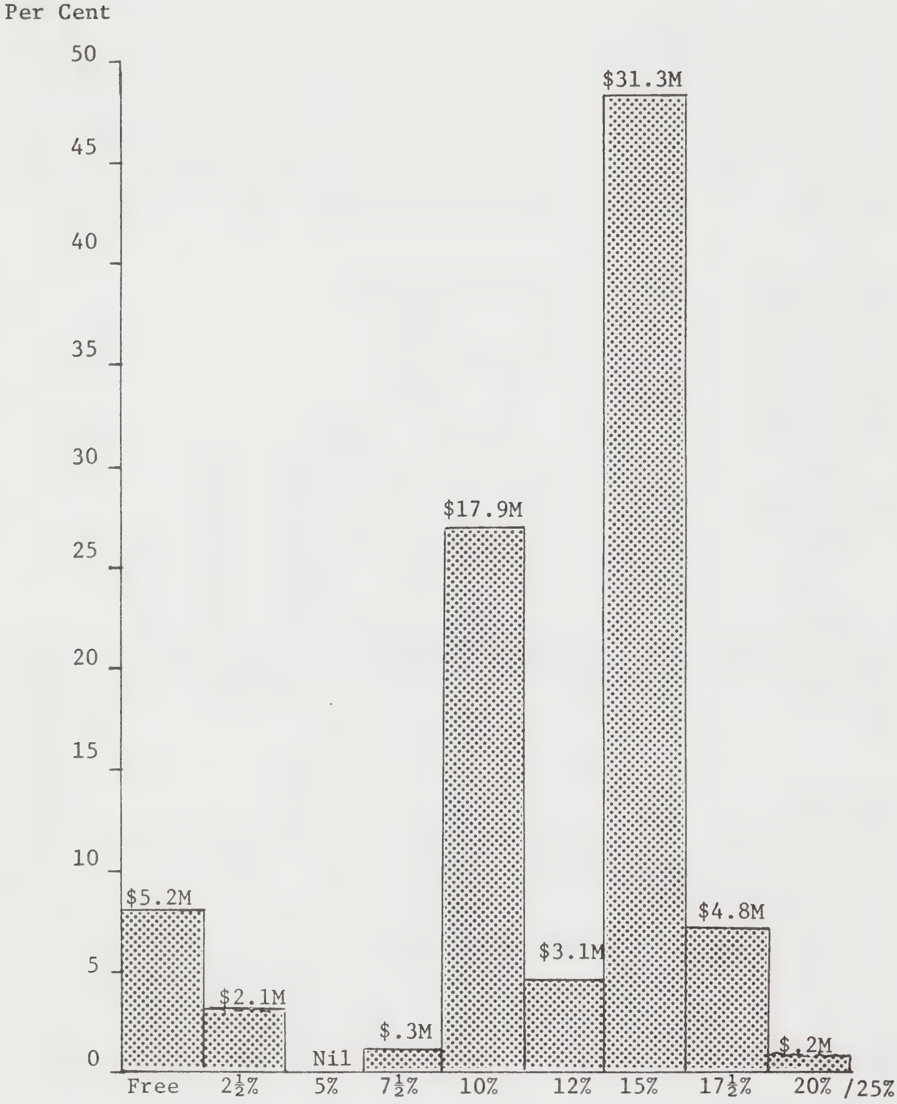


Notes: (a) Includes GATT duty rates.
(b) Excludes temporary duty rates.

Source: Tables 3.1 and 3.2.

Chart 3-3

VALUE AND PERCENTAGE DISTRIBUTION OF IMPORTS OF COMPUTING EQUIPMENT AND PARTS BY RATE OF DUTY, BEFORE REMISSIONS



Source: Table 3.5.

Table 3.5: Value of Imports of Computing Equipment and Parts, Two Months, 1971, by Tariff Item, by Rate of Duty Payable on All Imports of Computing Equipment and Parts, Before and After Remissions of Duties

Tariff Item	Rates of Duty		Value of Imports		Duty Paid		Average Ad Valorem Rate
	B.P.	M.F.N.	B.P.	M.F.N.	B.P.	M.F.N.	
	p.c.	p.c.	$	$	$	$	p.c.
34000-1	Free		X		-		
41203-1	Free	Free	-	7,738	-	-	
41201-1	Free	Free	-	7,210	-	-	
41202-1	Free		X		-		
41205-1	Free	Free		420		-	
41210-1	Free		-		-		
41215-1	Free	Free	-	X	-	-	
41220-1	Free	Free	X	-	-	-	
41305-1	Free	Free	-	7,726	-	-	
41405-1	Free		-		-		
41415-1	Free		609,530		-		
43155-1	Free	Free	-	X	-	-	
44022-1	Free	Free	-	192,916	-	-	
44051-1	Free	Free	-	X	-	-	
44059-1	Free	Free	-	X	-	-	
44506-1	Free		-		-		
44532-1	Free		-		-		
44539-1	Free	Free	-	4,710	-	-	
44553-1	Free	Free	X	X	-	-	
46115-1	Free	Free	-	X	-	-	
49105-1	Free	Free	-	23,982	-	-	
69605-1	Free	Free	X	3,000,328	-	-	
69610-1	Free	Free	-	X	-	-	
Sub-total			708,434	4,512,753	-	-	-
42700-1	2½		2,124,094		52,195		
46200-1	2½		X		X		
Sub-total			2,124,094		52,195		-
49210-1	5		-		-		-
41405-1		7½		X		X	
44532-1		7½		307,715		21,763	-
Sub-total				307,715		21,763	
34000-1		10		X		X	
41202-1		10		1,524,398		152,379	
41210-1		10		21,370		2,136	
41415-1		10		16,367,419		1,550,886	
44508-1	10		-		-		
44538-1	10		X		X		
44603-1	10		-		-		
Sub-total			X	17,913,187	X	1,705,401	9.52

Table 3.5 (Concl.)

Tariff Item	Rates of Duty B.P.	Rates of Duty M.F.N.	Value of Imports B.P.	Value of Imports M.F.N.	Duty Paid B.P.	Duty Paid M.F.N.	Average Ad Valorem Rate
	p.c.	p.c.	$	$	$	$	p.c.
44538-1		12½		3,157,038		387,435	
35400-1	15		-		-		
36800-1	15		-		-		
39000-1	15	15		78		12	
42700-1		15		31,294,066		4,690,812	
44524-1	15		74,427		11,210		
46200-1		15		8,967		1,193	
49210-1		15		13,930		2,089	
50600-1	15	15	-	X	-	X	
51902-1	15		-		-		
Sub-total			74,427	31,317,041	11,210	4,694,106	14.99
35400-1		17½		X		X	
44506-1		17½		1,105,880		193,636	
44508-1		17½		X		X	
44524-1		17½		3,666,753		612,469	
44603-1		17½		14,746		2,577	
51902-1		17½		X		X	
Sub-total				4,863,119		821,937	-
41400-1		20		X		X	
368001-		25		X		X	-
Total Imports			2,942,272	62,319,096	66,555	7,674,345	
Average Ad Valorem Rate					2.26 p.c.	12.31 p.c.	11.86
Duties Remitted					34,354	1,941,489	
Duties Actually Paid					32,201	5,732,856	
Average Ad Valorem Rate					1.09 p.c.	9.20 p.c.	8.83

X Signifies data omitted for reasons of confidentiality.

For various reasons, including duty remission by Order in Council, and changes in duty rates, the actual amount of duty paid in certain instances was less than would have resulted if the nominal rate of duty had been applied.

Source: Tariff Board survey.

The Board also calculated the weighted average rate of duty paid by broad categories of equipment. These calculations are shown in Table 3.6, both before and after remission of duties under tariff item 42700-1. The weighted average rates of duty under the combined B.P. and M.F.N. Tariffs, before the remission of duties, were 8.6 p.c. for mainframes; 11.5 p.c. for peripherals; 15.1 p.c. for related telecommunications equipment; and 13.9 p.c. for parts. It is clear that the level of protection is on average highest for related telecommunications equipment and lowest for mainframes. This divergence in average rates of duty becomes even greater after the remission of duties has been applied. The averages then become: mainframes, 8.4 p.c.; peripherals, 6.6 p.c.; related telecommunications equipment, 15.1 p.c.; and parts, 11.5 p.c. Remissions of duties substantially lowered the weighted average rates of duty paid on peripherals and on parts. This reflects, to a large extent, the types of equipment usually classified under tariff item 42700-1, i.e., peripherals and parts. No imports of related telecommunications equipment were reported under 42700-1; thus, duty remission was not applicable, and the average rate of duty paid remained at 15.1 p.c.

Of the $12.2 million of mainframes imported during the survey period, $11.9 million or 97 per cent entered under the M.F.N. Tariff; the bulk of these M.F.N. imports, $9.9 million or 83 per cent entered at a 10 p.c. rate of duty, with most of the remainder entering free of duty. All imports of mainframes subject to the B.P. Tariff entered free of duty. The remission of duty on imports of mainframes under tariff item 42700-1 amounted to $32,326 on a value of $215,508, which had only a marginal effect on the average rate of duty.

Peripheral equipment of $28.5 million, accounted for 44 per cent of all imports and was the largest of all product groups. Imports under the M.F.N. Tariff were $26.5 million or 93 per cent. The range of rates applicable to M.F.N. imports were from free to 20 p.c., with the largest value, $12.1 million or 45 per cent, entering at a rate of duty of 15 p.c. The bulk of imports under the B.P. Tariff, 79 per cent, entered at a 2½ p.c. rate of duty. Much of the remaining B.P. imports of peripherals entered free of duty. The remission of duty on imports of peripherals under tariff item 42700-1 amounted to $1,388,297 on a value of $10,112,934. This had a significant effect on the average rates of duties actually paid: from 2.45 p.c. to 1.15 p.c., B.P. Tariff; and from 12.15 p.c. to 7.00 p.c., M.F.N. Tariff. Over-all, the reduction in the rate of duty paid on peripherals resulting from remissions amounted to nearly 5 percentage points.

All related telecommunications equipment imports entered under the M.F.N. Tariff at three rates of duty: free, 10 and 17½ p.c. By far the largest proportion of this equipment entered at a rate of duty of 17½ p.c.

Table 3.6: Value of Imports of Computing Equipment and Parts, Two Months, 1971, by Tariff Item, by Product Group, by Rate of Duty Payable and Average Rate of Duty Paid on All Imports of Computing Equipment and Parts, Before and After Remissions of Duties

Tariff Item	Rates of Duty		Value of Imports		Duty Paid		Average Ad Valorem Rate
	B.P.	M.F.N.	B.P.	M.F.N.	B.P.	M.F.N.	
	p.c.	p.c.	$	$	$	$	p.c.
Mainframes							
41202-1		10		X		X	
41415-1	Free	10	X	9,872,311	-	987,194	
42700-1		15		414,770		62,215	
44022-1		Free		192,816		-	
44524-1		17½		X		X	
69605-1		Free		1,359,350		-	
Total Mainframes			X	11,902,213	-	1,056,848	
Average Ad Valorem rate					-	8.88 p.c.	8.64
Duties Remitted					-	32,326	
Duties Actually Paid					-	1,024,522	
Average Ad Valorem rate					-	8.61 p.c.	8.38
Peripherals							
41023-1		Free		7,738		-	
41202-1	Free	10	X	1,290,139	-	128,990	
41210-1		10		21,370		2,136	
41215-1		Free		X		-	
41220-1	Free		X		-		
41305-1		Free		7,726		-	
41400-1		20		X		X	
41415-1	Free	10	X	4,203,681	-	337,954	
42700-1	2½	15	1,560,864	12,089,858	39,016	1,809,716	
43155-1		Free		17,336		-	
44051-1		Free		X		-	
44059-1		Free		X		-	
44506-1		17½		1,008,171		176,548	
44508-1		17½		X		X	
44524-1	15	17½	X	2,109,224	X	344,467	
44532-1		7½		282,597		21,189	
44538-1	10	12½	X	2,873,614	X	352,030	
46115-1		Free		X		-	
46200-1	2½	15	X	8,845	X	1,175	
49105-1		Free		X		-	
49210-1		15		13,930		2,089	
51902-1		17½		X		X	
69605-1	Free	Free	X	1,208,086	-	-	
Total Peripherals			1,973,117	26,484,865	48,407	3,217,448	11.48
Average Ad Valorem rate					2.45 p.c.	12.15 p.c.	
Duties Remitted					25,728	1,362,569	
Duties Actually Paid					22,679	1,854,879	
Average Ad Valorem rate					1.15 p.c.	7.00 p.c.	6.60

Table 3.6 (Concl.)

Tariff Item	Rates of Duty B.P.	Rates of Duty M.F.N.	Value of Imports B.P.	Value of Imports M.F.N.	Duty Paid B.P.	Duty Paid M.F.N.	Average Ad Valorem Rate
	p.c.	p.c.	$	$	$	$	p.c.
Related Telecommunications Equipment							
41415-1		10		X		X	
44506-1		17½		37,840		6,617	
44508-1		17½		X		X	
44524-1		17½		X		X	
69605-1		Free		X		-	
Total Related Telecommunications Equipment				889,144		134,512	
Average Ad Valorem rate						15.13 p.c.	
Duties Remitted						-	
Duties Actually Paid						134,512	
Average Ad Valorem rate						15.13 p.c.	
Parts and Components							
34000-1	Free	10	X	X	-	X	
35400-1		17½		X		X	
36800-1		25		X		X	
39000-1		15		78		12	
41201-1		Free		7,210		-	
41202-1	Free	10	X	186,783	-	18,643	
41205-1		Free		420		-	
41405-1		7½		X		X	
41415-1	Free	10	X	2,259,752	-	222,571	
42700-1	2½	15	563,230	18,789,438	13,179	2,818,881	
44506-1		17½		59,869		10,471	
44524-1	15	17½	24,457	868,656	3,716	151,927	
44532-1		7½		25,118		574	
44538-1	10	12½	X	283,424	X	35,405	
44539-1		Free		4,710		-	
44553-1	Free	Free	X	X	-	-	
44603-1		17½		14,746		2,577	
46200-1		15		X		X	
49105-1		Free		X		-	
50600-1		15		X		X	
69605-1	Free	Free	X	351,595	-	-	
69610-1		Free		364		-	
Total Parts and Components			639,912	23,042,874	18,148	3,265,547	
Average Ad Valorem rate					2.84 p.c.	14.17 p.c.	13.87
Duties Remitted					8,626	546,594	
Duties Actually Paid					9,522	2,718,943	
Average Ad Valorem rate					1.49 p.c.	11.80 p.c.	11.52
Total All Imports			2,942,272	62,319,096	66,555	7,674,345	
Average Ad Valorem rate					2.26 p.c.	12.31 p.c.	11.86
Duties Remitted					34,354	1,941,489	
Duties Actually Paid					32,201	5,732,856	
Average Ad Valorem rate					1.09 p.c.	9.20 p.c.	8.83

X Signifies data omitted for reasons of confidentiality.

Source: Tariff Board survey.

Parts and components, at a value of $23.7 million, constituted the second largest category of computing equipment imports. Ninety-seven per cent, or $23 million, entered under the M.F.N. Tariff. Rates applicable to M.F.N. imports of parts ranged from free to 25 p.c. The majority of parts imports entered under four M.F.N. rates: $18.8 million, or 79 per cent, entered at 15 p.c.; $2.4 million, or 10 per cent, at 10 p.c.; $0.9 million, or 4 per cent, at 17½ p.c.; and $0.5 million, or 2 per cent, free of duty. Imports of parts under the B.P. Tariff were mostly at a 2½ p.c. rate of duty, with 88 per cent of the total value. Duty remissions on imports of parts under tariff item 42700-1 amounted to $555,220 on a value of $3,988,977. The effect of these on the average rates of duties actually paid was again significant, although less so than on peripherals: 2.8 p.c. to 1.5 p.c. under the B.P. Tariff, and from 14.2 p.c. to 11.8 p.c. under the M.F.N. Tariff. The over-all reduction in the rate of duty on parts due to remissions was 2.3 p.c.

The importers of parts used in the manufacture or assembly of computing equipment for export actually pay much less than the 11.5 p.c. paid under both the M.F.N. and B.P. Tariffs after remissions. In fact, most of the duty paid is returned to these companies pursuant to the drawback provisions of the Customs Act which authorizes the drawback of duties paid on parts, components and subassemblies which are incorporated into finished products which are subsequently exported. Responses to Tariff Board questionnaires by the computer hardware industry revealed that some 96 per cent of the imported parts are re-exported in the form of finished units of equipment. By applying this percentage to the duties paid on parts, after remission of $2.7 million, the drawback of duties would amount to $2.6 million. The residual cost of duties to importers on imports of $23.7 million resulted in an average rate of duty paid on parts of 0.5 per cent.

As a result of the drawback of duties, the producer of computing equipment for the export market obtains his imported production parts free of duty, while the producer of computing equipment for the domestic market is subject to a duty on imported parts averaging 11½ p.c., and as high as 25 p.c. Moreover, the tariff provides no protection to Canadian parts producers with respect to imported parts eventually re-exported; they receive protection only with respect to production parts incorporated into units of equipment produced in Canada for the domestic market. As will be explained in the next chapter, this involves only a small volume of the production of computing equipment, and hence, an equally small volume of production parts.

The Machinery Program

The Machinery Program on Remission of Duties Under Tariff Item 42700-1 was established on January 1, 1968 in order to increase efficiency throughout Canadian industry by enabling machinery users to acquire advanced equipment at the lowest possible cost, while at the same time affording Canadian machinery producers tariff protection on their manufactured machines. The value of imports of computing equipment that has been granted remission of duties has increased steadily and substantially since the Program's inception in 1968.

The protection afforded machinery producers in Canada was realized by the replacement of 18 previous machinery tariff items with B.P. rates of duty ranging from Free to 10 p.c., and with M.F.N. rates of duty ranging from $7\frac{1}{2}$ p.c. to $22\frac{1}{2}$ p.c., by a single tariff item, 42700-1, with a B.P. rate of $2\frac{1}{2}$ p.c., and an M.F.N. rate of 15 p.c. The 18 deleted tariff items covered a broad range of machines, including general purpose machinery, construction and materials handling equipment, various types of special industry machinery, pulp and paper and plastics industry machinery, and service industry equipment.(1) These goods could now be expected to fall under tariff item 42700-1, which provided for the entry of "machines, not otherwise provided for, and accessories, attachments, control equipment and tools for use therewith, and parts of the foregoing." The complete wording of this item is repeated here for the benefit of the reader.

	B.P.	M.F.N.	Gen.	
Tariff Item 42700-1				
Machines, n.o.p., and accessories, attachments, control equipment and tools for use therewith; parts of the foregoing	$2\frac{1}{2}$ p.c.	15 p.c.	35 p.c.	
G.P.T. rate from 1/7/74 to 10/6/84				$2\frac{1}{2}$ p.c.
Except that in the case of the importation into Canada of any goods enumerated in this item, the Governor in Council on the recommendation of the Minister of Industry, Trade and Commerce may, whenever he considers that it is in the public interest and that the goods are not available from production in Canada, remit the duty specified in this item applicable to the goods, and subsections 17(2), (3), (4), (5) and (8) of the Financial Administration Act apply in the case of a remission granted under this provision.				

Remission on machinery imported under 42700-1 may be refused if at least one Canadian manufacturer has proven capability to manufacture machinery which, in so far as its range of physical qualities, operational characteristics and efficiency are concerned, is reasonably equivalent to the machinery for which remission is sought. It is deemed that proven capability exists when the full range of technical and physical capabilities necessary for production of the machinery exists within the operational framework of at least one manufacturer and where such facilities have in fact been used to demonstrate competence reasonably equivalent to that required to produce the machinery for which remission is sought.

(1) A complete list of the 18 deleted tariff items can be found in Appendix B, p. 355.

Application for remission may be made by the user, or an importer other than the user, before importation or normally not later than 90 days after the date of customs clearance. If an importer other than the user makes an application, satisfactory assurances must be included that the remission of duties will be reflected in prices to users. The first step upon receipt of the application is the determination by the Department of National Revenue if the goods in question are classified under 42700-1. If they are, the application is then referred to the Machinery and Equipment Advisory Board in order that advice may be given to the Minister of Industry, Trade and Commerce regarding the eligibility of the machinery for remission of duty in accordance with the provisions of tariff item 42700-1. Upon recommendation of the Minister the Governor in Council may grant remission. A rejection of an application for remission can be appealed to the Machinery and Equipment Review Board.

It is evident from the foregoing that, in order for computing equipment and parts to be eligible for remission of duties, they must be classified or classifiable under tariff item 42700-1. Computing equipment could be classified under 42700-1 if it is not provided for under another tariff item and if it qualifies as a "machine".

Department of National Revenue defines a machine in Memorandum D46-20, page 8 (May 1, 1972), as follows:

> a machine is comprised of a more or less complex combination of moving and stationary parts and does work through the production, modification or transmission of force and motion.

The Board could not ascertain the extent to which this definition has had applicability in the classification of computing equipment to 42700-1, but the evidence that a large volume and variety of computing equipment has entered under this tariff item implies that its nomenclature has been deemed suitable, or at least sufficiently suitable for this purpose, given the void in the tariff for computing equipment per se. Of direct relevance in this regard is the conditional clause "not otherwise provided for" included in the nomenclature of tariff item 42700-1. Any specifically named machinery tariff items, therefore, would take precedence over tariff item 42700-1 and, in fact, tariff item 41415-1 (bookkeeping, calculating and invoicing machines and complete parts thereof, n.o.p.) is one example. Computer mainframes are usually classified under tariff item 41415-1, and it is conceivable that these have been regarded as "calculating machines" in contrast to other units of computing equipment. It may well be that tariff item 42700-1 has been used to accommodate all of those units of equipment having "mechanical" features, and many of their parts, which could not readily be fitted elsewhere in the tariff.

The accessories, attachments, control equipment and tools, for use with the machine on which remission of duties has been granted will, when imported as integral parts of that machine, also be granted remission. When they are not imported as integral parts of a machine they may be considered for remission separately from the machine with which they are used provided that such accessories, attachments, control equipment or tools are classifiable under 42700-1; when they are shipped separately and are not classifiable under 42700-1, remission of duties is precluded. Accordingly, when computing equipment

comprises in whole or in part the control equipment for the machines entering under this item, then it could be classified under 42700-1.

Parts to be incorporated in machinery being manufactured in Canada, i.e., production parts, may be granted remission of duty provided they are classifiable under 42700-1, and provided they meet the "public interest" and "availability" criteria. Replacement parts will normally be granted remission along with the related machines or equipment. However, not all parts of the machines and accessories, e.g., attachments, control equipment and tools for use with such machines, are classified under 42700-1. Customs Memorandum D46-20, page 10 (May 1, 1972), specified that:

> Parts which are provided for by name elsewhere in the Customs Tariff are not to be classified under the provision for "parts" for "machines, n.o.p." However, parts which are provided for by name elsewhere in the Customs Tariff may be classified under the provision for "parts" for the accessories, attachments, control equipment and tool, if the naming item is qualified by "n.o.p.".

This definition would appear, however, to permit most subassemblies, components and parts, imported for the repair or replacement of computing equipment classified under 42700-1, also to be classified under this item, because few of the subassemblies, components and parts are specifically provided for elsewhere. Imports of subassemblies, components and parts entering under tariff item 42700-1 amounted to $19.4 million, 58 per cent of all imports of computing equipment and parts under this item. The Board believes that the largest proportion of these imports represent production parts of a kind not available in Canada.

Imports, other than under tariff item 42700-1, account for a large proportion of total imports of computing equipment and parts - 48 per cent for the time period covered by the Board's import analysis. Such imports are, as a result, not eligible for remission of duties under 42700-1. Some of these imports enter free of duty under end-use tariff items. It would appear, however, that most of the imports of computing equipment and parts classified outside 42700-1 are dutiable, and of the duty-free tariff items only 69605-1 accounts for a significant proportion of total imports.

From the Machinery Program's inception in 1968, to 1973, the average growth rate for imports granted duty remission, compounded annually, was 43 per cent. In contrast, the average growth rate for all computing equipment imports over the same period was 22 per cent. More recently, from 1970 to 1973, the growth rates were 24 and 15 per cent, respectively.

Table 3.7: The Value of Imports of Computing Equipment and Parts for Which Duty was Remitted, and the Estimated Values of Duties and Sales Taxes Remitted, by Year, 1968-73

	Value of Eligible Imports	Estimated Duty Remission[a]	Estimated Sales Tax Remission[b]
	$'000	$'000	$'000
1968	15,304	2,219	-
1969	14,161	2,053	-
1970	48,293	7,002	840[c]
1971	54,430	7,892	947
1972	69,902	10,136	1,216
1973	91,253	13,232	1,588

(a) Estimated duty remission calculated at 14.5% on the basis of the mix of imports under B.P. and M.F.N. Tariffs in the Tariff Board Survey.

(b) Estimated sales tax remission calculated on the difference in values for duty and sales taxes before and after duty remission.

(c) Sales tax remission on the difference was not authorized by Order in Council before July 8, 1970. The figure shown applies to the whole of 1970.

Source: Department of Industry, Trade and Commerce, Machinery Program, Analysis of Imports, Annual Reports; Tariff Board Estimates.

It may be inferred from these figures that the relevant imports classified under 42700-1 have experienced a higher rate of growth than have computing equipment imports generally. This may be due to a number of factors including the relatively higher growth in the demand for peripheral equipment than for mainframes, the growth in the demand for new types of equipment and parts for which there may be no other provision in the tariff, and the possibility that importers may have been using tariff item 42700-1 in the belief that equipment classified thereto would be eligible for duty remission under the Machinery Program.

Value for Duty

The amount of duty payable on dutiable imports is determined by applying the rate of duty to the value of the commodity. In previous sections the rates of duty applicable to relevant tariff items have been discussed; this section considers the main aspects relating to valuation for duty for computing equipment.

Valuation for duty is determined by sections 36 to 44 of the Customs Act. The basic principle on which Canadian customs valuation is based is that of "fair market value" (FMV) of sales of "like" goods in the country of export. Section 36 defines the rules to be applied to "like" goods, including the level of trade at which sales are made, the quantities involved, the timing of sales, and the applicability of

trade marks, in order to arrive at the FMV. Section 37 specified how the value for duty shall be calculated where "like" goods were not sold for home consumption in the circumstances described in section 36, but where "similar" goods were so sold. Under section 37 "similar" goods are to be valued at the cost of production (material, labour and factory overhead), plus the same percentage of the cost of production as the gross profit realized on "similar" goods. Section 39 provides that the value for duty shall be determined by ministerial prescription. It applies where, in the opinion of the Minister, the application of sections 36 and 37 is impracticable, where further manufacture is intended, where the goods are used or obsolete, or where "like" goods are leased but not sold in the country of export.

Computing equipment is subject to the same provisions of the Act concerning valuation as is any other commodity. There are, however, a number of characteristics relating to the equipment itself and to the computer hardware industry that makes the task of valuation of computing equipment an involved and complex undertaking.

The practice in the industry has been to rent rather than sell equipment to the end-user. In the past the Department of National Revenue has applied the ministerial prescription under section 39 to situations where leasing or renting accounted for 90 per cent of total goods shipped by a company in the market of the exporting country. However, in recent years the method of acquisition of computers has changed. In the United States some 36 per cent of users have purchased their general-purpose computers, 43 per cent have rented them from manufacturers, and 21 per cent have leased them from third-party leasing companies.(1) In other words U.S. manufacturers now sell more than half of their general purpose computers.

Another practice in the industry has been for the manufacturer to supply computer goods directly to end-users. This implies the absence of a level of trade at the distributor or dealer level, with the consequent resort to ministerial prescription to arrive at FMVs. More recently, however, the growth in the number of companies in the industry, together with the larger variety of products, has meant that there now exist several levels of trade. Sales are made to OEMs (original equipment manufacturers), distributors, dealers and end-users; moreover, quantity discounts may be given to very large customers.

In the computer industry characterized as it is by rapid change, the problem of valuation administration is indeed difficult. Prices at the retail level, where much of the trade takes place, can fluctuate as a result of competitive and inflationary pressures. Price lists are adhered to by some companies but not by others. Manufacturing costs incurred for a particular product can also fluctuate over time, with deflationary pressures brought about by advances in technology and inflationary pressures caused by wage, overhead and material price increases. In these circumstances it is difficult to ensure that the customs valuation of particular products accurately reflects current fair market values.

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(1) EDP Industry Report, Vol. 9, No. 13, International Data Corporation, Newtonville, Massachusetts, April 19, 1974, p. 6.

Where the valuation of computer systems is concerned, it has been the practice of industry to price its products at a level that is sufficient to offset the costs incurred in the development and supply of operating systems software. Although the software thus included in the price is not generally speaking considered by customs officials to be part of the value of the equipment at present, in practice this holds true only if the supplier has received a valuation guideline or "ruling" from Customs to the effect that manufacturing cost-plus is the applicable formula. Only a manufacturing cost-plus ruling disregards the value of software provided within the price to the user.

The foregoing comments serve to illustrate some of the complexities involved in arriving at precise and equitable values for duty for computing equipment. It is apparent that there are no industry-wide or product-wide values for duty; the value of each importation is determined by the applicable circumstances in the country of origin. In practice the type of ruling, whether section 36, 37 or 39 of the Customs Act is applied, plays a large role in the determination of value for duty. The result is that two companies, each importing products that are essentially comparable, could have widely differing values for duty assessed against them. One company may only lease its products in the country of origin, while the other company may only sell its products there at the retail level. In the first instance, a ruling under section 39 will result in the application of a manufacturing cost-plus formula, while in the second instance, a ruling under section 36 will result in the application of a country-of-origin list price formula.

During the course of its study, the Board found that a variety of rulings applied to the companies in the industry, or to their products. For those companies or products subject to section 36 of the Customs Act, the permitted FMVs ranged from country-of-origin retail list price less 7 per cent to less 50 per cent. For those subject to section 37 or 39 of the Customs Act, the permitted FMVs ranged from manufacturing cost plus 50 per cent to cost plus 60 per cent. These variations in valuation for duty result in differences in the incidence of the nominal tariff among Canadian importers of computing equipment, thus providing some suppliers with a competitive edge over others.

It should be noted that the Department of National Revenue, Customs and Excise is currently carrying out a review of its procedures for determining the value for duty of computing equipment. In fact the whole Customs Act, including the valuation sections 36 to 44, is presently under study by the Department of National Revenue and interested groups.

Federal Sales Tax

The application of the federal sales tax to data processing products and parts was an issue that arose at the public sittings. Unless sales are made under prescribed conditions which defer the tax or exempt the goods from tax, this tax is payable, in the case of domestically produced goods, on the manufacturer's selling price and, in the case of imported goods, on the duty-paid value. When goods are leased or rented rather than sold, methods are prescribed by which the value for sales tax can be established.

When parts are imported into Canada by a licensed manufacturer, no tax is payable as the parts will be incorporated into a finished taxable product. If products or parts are imported by a licensed wholesaler, the tax is not paid, until he in turn sells the goods, but is still based on the duty-paid value. Sales of parts by a licensed wholesaler to a licensed manufacturer for incorporation into a finished taxable product would, of course, be exempt from tax for the same reason that the manufacturer pays no tax on directly imported parts.

In the case of finished computer products, the Canadian manufacturer usually sells directly to users; the sales tax is based on the price at this level, which must include provisions for costs of advertising, installation, servicing, warranty, etc. The duty-paid value of imported goods, which remains the basis for tax on such goods, while including the Customs Duty, would not as a rule include provisions for these other costs which are met by the importer, usually a wholesaler or distributor.

As will be reported in Chapter IX, the simple average value for duty of several systems, expressed as a percentage of their user prices in the United States, is 46 per cent. Thus, users of imported systems are paying sales tax on approximately one-half the user price in the United States (after duty has been added to the value for duty), while users of domestic equipment pay the tax on the basis of the full Canadian price to users. These differences bear out the observations of the Royal Commission on Taxation with respect to the difficulties in ensuring the neutrality of a sales tax. As the Commission states on pages 6 and 7 of Volume 5 of its report: "A sales tax imposed at any level prior to the retail level inevitably lacks neutrality" and "At whatever point the tax is imposed, the value added between the point of imposition of the tax and the point of final sale must be proportionately the same for imported goods as for domestically processed goods if the neutrality test is to be met." The Board was advised, during the public sittings and on visits to companies, that the present situation favours imported goods.

As already indicated, sales of goods under certain circumstances are exempt from sales tax. Goods for use in the manufacture or production of goods are exempt, as are goods sold to bona fide public hospitals. Exemption is also extended to goods, whether domestically produced or imported, enumerated in certain Customs Tariff items, or for use exclusively in the manufacture of goods enumerated in certain tariff items. Both types of exemptions apply to tariff items 69605-1 and 69610-1, but to no other tariff items appearing in Tables 3.1 and 3.2.

The sales tax exemption accorded to goods enumerated in tariff item 69605-1 is applicable to the item as it was worded immediately prior to June 4, 1969; the relevant portions of the wording in effect at that time were:

> Philosophical and scientific apparatus (and ancillary equipment thereto), utensils, instruments and preparations, including boxes and bottles containing the same; ... mechanical equipment of a class or kind not made in Canada; parts of the foregoing. All articles in this item, when for the use and by order of any society or institution incorporated or established solely for religious, philosophical, educational, scientific or literary purposes, or for the encouragement of the fine arts, or for the use and by order of any public hospital, college, academy, school, or seminary of learning in Canada, and not for sale or for rental, under such regulations as the Minister may prescribe.

Tariff item 69610-1 provides for "Materials and articles for the manufacture of the goods specified in tariff item 69605-1."

A significant point with respect to these two tariff items is that they not only carry an automatic exemption from sales tax, but that all goods imported under these are free of duty under all tariffs. The changes in wording for tariff item 69605-1, effective from June 4, 1969, may have broadened somewhat the applicability of the item to data processing products and parts; the relevant portions of the item now read:

> Scientific apparatus (and ancillary equipment thereto), utensils, instruments, and preparations, including boxes and bottles containing them;
>
> ...
>
> Utensils, instruments and other apparatus not otherwise enumerated in this item, of a class or kind not made in Canada, for use directly in teaching or research;
>
> Mechanical equipment not otherwise enumerated in this item, when of a class or kind not made in Canada;
>
> Parts of all the foregoing.
>
> All the foregoing where for the use of any society or institution incorporated or established solely for religious, educational, scientific or literary purposes, or for the encouragement of the fine arts (namely architecture, sculpture, painting, engraving and music), or for the use of any public hospital, public library, public museum, university, college, academy, school or seminary of learning in Canada and not for sale or rental unless to those mentioned herein, under such regulations as the Minister may prescribe.

The inclusion of the paragraph "Utensils ... research," as well as the broadening of the categories of users of the items may have resulted in a situation where data processing products and parts could be imported free of duty under the tariff item as it now stands, but still be subject to sales tax in some cases, because their liability for sales tax would have to be determined according to the wording of tariff item 69605-1 as it was prior to June 4, 1969.

The provision of free entry and sales tax exemption for equipment imported by universities, in particular, was an issue raised at the public sittings by the spokesmen for the service bureaux, who felt that this provision deprived them of access to a lucrative market for their services. However, that a university could not sell computer services to a commercial or other institution not covered by tariff item 69605-1 without risking loss of the tariff exemption granted and such sales, even to another qualified institution, might risk the loss of the sales tax exemption.

Tariff items 69605-1 and 69610-1 were not included among the items specifically referred to the Board in this Reference and questions relating to sales tax are outside the Board's terms of reference.

OTHER COUNTRIES' TARIFF ITEMS AND TARIFF RATES

This section examines the tariff treatment accorded computing equipment by other countries. Of prime concern is the schedule by which most countries arrange their customs tariffs. The Brussels Tariff Nomenclature (BTN) is important as are the Tariff Schedules of the United States (TSUS); the latter because most of Canada's computing equipment exports are sent to that country. The examination of the BTN and the TSUS provides a basis for comparison between Canadian and foreign tariff treatment where computing equipment and parts are concerned.

The Brussels Tariff Nomenclature

The BTN is the common derivation of the "Nomenclature for the Classification of Goods in Customs Tariffs." Goods are grouped into 21 Sections, comprising 99 Chapters, which, in turn, are subdivided into a large number of headings. The BTN is intended to cover all goods normally traded in international commerce, and computing equipment and parts are mainly covered under Chapter 84, which provides for "Boilers, Machinery and Mechanical Appliances; Electrical Equipment; Parts thereof."

Heading 84.53 is the single most important classification for finished products which are relevant to this Reference. The most significant paragraphs from heading 84.53 read as follows:

> AUTOMATIC DATA PROCESSING MACHINES AND UNITS THEREOF; MAGNETIC OR OPTICAL READERS, MACHINES FOR TRANSCRIBING DATA ONTO DATA MEDIA IN CODED FORM AND MACHINES FOR PROCESSING SUCH DATA, NOT ELSEWHERE SPECIFIED OR INCLUDED.
>
> (I) AUTOMATIC DATA PROCESSING MACHINES AND UNITS THEREOF
>
> (A) DIGITAL MACHINES
>
> Digital data processing machines usually consist of a number of separately-housed interconnected units. They then form a "system". A complete digital data processing system must comprise, at least:

(1) A central processing unit.
(2) An input unit.
(3) An output unit.
These systems may include remote input and output units in the form of data terminals. Such systems may also include peripheral units, apart from the input and output units, designed to increase the capacity of the system ... Such units are inserted between the input and output units (start and end of system), although adapting and converting units (channel adaptors and signal converters) may occasionally be connected before the input unit or after the output unit.

A unit is to be regarded as being a part of the complete digital data processing system, if it satisfies the following conditions:
(a) It is connectable to the central processing unit, either directly or through one or more other units; and
(b) It is specifically designed as part of such a system.

(B) ANALOGUE MACHINES

Analogue data processing machines must comprise at least:
(1) Analogue elements.
(2) Control elements.
(3) Programming elements.
These analogue machines may also incorporate:
(4) Elements having an input function
(5) Elements having an output function
All the above devices are contained in a single housing and form a self-contained unit.
Such machines may be connected to peripheral units such as: (i) Punched tape readers. (ii) Curve followers. (iii) Tape punches. (iv) Graph plotters. (v) Time plotters, etc.
The machine and the peripheral unit(s) then make up an analogue data processing system.

(C) HYBRID (ANALOGUE/DIGITAL) MACHINES

Hybrid machines comprise an analogue machine with digital elements, or a digital machine with analogue elements. There are also hybrid data processing systems consisting of an analogue and a digital system interconnected by means of one or more hybrid interfaces ...

(D) SEPARATELY IMPORTED UNITS

The present heading also covers separately imported constituent units of data processing systems ... such units include:

(1) Additional input and output units.
(2) Additional storage.
(3) Additions which enhance the processing power.
(4) Control and adaptor units.
(5) Signal converting units.
(6) Power supply units.

(II) MAGNETIC OR OPTICAL READERS, MACHINES FOR TRANSCRIBING DATA ONTO DATA MEDIA IN CODED FORM AND MACHINES FOR PROCESSING SUCH DATA, NOT ELSEWHERE SPECIFIED OR INCLUDED.

(A) MAGNETIC OR OPTICAL READERS

(1) Magnetic readers.
(2) Optical readers.
The readers described above are classified in this heading only if imported separately. When combined with other machines ... they are classified with those machines provided that they are imported with them.

(B) MACHINES FOR TRANSCRIBING DATA ONTO DATA MEDIA IN CODED FORM

(1) Card or tape punches and magnetic tape encoders.
(2) Verifying machines.
(3) Machines for transferring coded information from one medium to another. ... includes reproducing machines ...

(C) MACHINES FOR PROCESSING DATA, DECODING AND GIVING THE RESULT IN CLEAR

(1) Calculators.
(2) Readers ... includes interpreting machines ...
(3) Card sorting machines, card collators, etc.
(4) Tabulating machines.

It can be seen from the foregoing that the BTN contains two basic categories of computing equipment: category (I), which covers data processing systems and constituent units thereof; and category (II), which covers data processing machines that are generally independent of, and not interconnected with, a central processing unit. Within category (I) there is provision for both systems of equipment and for separately imported units that constitute such systems. Of key interest is the definition of a unit under category (I)(A). In essence, a unit is to be regarded as being part of a digital data processing system if it is connectable to the central processing unit, and if it is specifically designed as part of such a system. This would seem to indicate that a wide range of equipment is encompassed by category (I), and when viewed in conjunction with the machines in category (II), it is conceivable that all of the finished products deemed to fall within the scope of this Reference are classifiable under heading 84.53.

Some questions remain, however, concerning the classification under the BTN of a few products that have alternative uses, or that are not easily classifiable. These products include: automatic electric typewriters; teletypewriters and teleprinters; and point-of-sale (POS) terminals. This group of products is used for purposes other than data processing and would, therefore, be excluded from heading 84.53. In fact, if as is likely, their actual classification is based upon written statements as to their principal use, in accordance with Chapter Note 5 of Chapter 84,[1] they would be classified under heading 84.53 if data processing was their principal purpose, otherwise under the headings for typewriters (84.51), electrical line telephonic and telegraphic apparatus (85.13), or cash registers (84.52). Classification difficulties also arise with small accounting computer systems. It is not clear whether they are classifiable under heading 84.53 or under heading 84.52 (B) - accounting machines, which contains nomenclature that could encompass visible record computers, a type of small accounting computer system. Similar questions involve related telecommunications equipment. It is conceivable that these devices are considered to be constituent units of a data processing system, particularly because remote data terminals noted under heading 84.53 would not be operable without such devices. They may, therefore, be encompassed within the designations "control and adaptor units" and "signal converting units" mentioned in heading 84.53. However, modems and multiplexers are noted specifically within the context of message transmission under Chapter headings 85.13 and 84.15, respectively.

Parts and accessories for the machines described under heading 84.53 are mostly provided for under heading 84.55. The heading reads:

> 84.55 - PARTS AND ACCESSORIES (OTHER THAN COVERS, CARRYING CASES AND THE LIKE) SUITABLE FOR USE SOLELY OR PRINCIPALLY WITH MACHINES OF A KIND FALLING WITHIN HEADING NO. 84.51, 84.52, 84.53, OR 84.54.

There are, however, separately enumerated parts provided for as follows: printed circuits, heading 85.19; diodes, transistors, and similar semiconductor devices, heading 85.21; electronic microcircuits, heading 85.21; and assemblies of electronic microcircuits, heading 85.55. In this practice, the BTN resembles the Canadian tariff, where most of the computing equipment tariff items have parts provisions, but where certain parts, including some of those identified above, are separately enumerated in their own "eo nomine" tariff items.

Data processing media are mostly provided for under heading 92.12:

> 92.12 - GRAMOPHONE RECORDS AND OTHER SOUND OR SIMILAR RECORDINGS; MATICES FOR THE PRODUCTION OF RECORDS, PREPARED RECORD BLANKS, FILM FOR MECHANICAL SOUND RECORDING, PREPARED TAPES, WIRES, STRIPS AND LIKE ARTICLES OF A KIND COMMONLY USED FOR SOUND OR SIMILAR RECORDING.

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(1) Chapter Note 5 reads as follows: "A machine which is used for more than one purpose is, for the purposes of classification, to be treated as if its principal purpose were its sole purpose."

It is evident that no distinction is made between sound recording media and data recording media under the BTN. This is also the current Canadian practice where magnetic tape is concerned. It is understood that if computer operating systems software, or any other software is recorded on a medium falling within this heading, it would be classified under heading 92.12, and would be valued for duty at the value of the medium.

It may be concluded that there are basically two heading for computer hardware in the BTN: heading 84.53, for finished products and heading 84.55, for parts. The BTN is somewhat uncertain concerning the classification of a number of products, particularly those having alternative uses; it seems, however, that principal use, at the time of importation, is the determining factor. These two heading are in contrast to the sixty-three Canadian tariff items under which computing equipment currently enters. It is of interest to note that the term "computer" is not mentioned anywhere in the BTN; rather the term "data processing" appears to be preferred, and has been used consistently throughout heading 84.53. There also appears to have been no hesitation in applying the term "machines" to all units of data processing equipment.

The Tariff Schedules of the United States

Computing equipment and parts are provided for in the Tariff Schedules of the United States (TSUS) mainly under Schedule 6, Metals and Metal Products, Part 4, Machinery and Mechanical Equipment, where they are enumerated in broad terms. The relevant tariff items read as follows:

Item	Stat. Suffix	Article	Units of Quantity	MFN Rates of Duty
		Calculating machines; accounting machines, cash registers, postage-franking machines, ticket-issuing machines, and similar machines, all of the foregoing incorporating a calculating mechanism:		
676.15	00	Accounting, computing and other data-processing machines	No.	5.5% ad val.
676.30		Office machines not specially provided for		5% ad val.
	20	Office copying machines	No.	
	30	Data processing machines	No.	
	50	Other	No.	
		Parts of the foregoing:		
676.50	00	Typewriter parts	x	9.5% ad val.
676.52	00	Other	x	5.5% ad val.

An examination of United States imports by tariff item does not, unfortunately, reveal information of a more descriptive nature. Total imports for the three most relevant items, 676.1500, 676.3030 and 676.5200, amounted to $349 million in 1972, $344 million in 1973, and $387 million in 1974. The bulk of imports was accounted for by tariff item 676.5200, with 50, 68 and 70 per cent of the totals, respectively. It is probable that the bulk of these parts relate to calculating machines, accounting machines, cash registers and the like, which are included under items 676.15, 676.20, 676.22 and 676.23, but the Board was unable to ascertain the extent to which relevant parts enter under item 676.5200, nor the types of data processing equipment that enter under 676.1500 and 676.3030. It is believed, however, on the basis of comments by exporters, that "Parts of the foregoing: other" under item 676.5200 may be accorded an interpretation sufficiently broad to enable units of equipment to be classified therein. Modems have been cited as examples. The Board has also learned that software recorded on magnetic tape has been classified to 676.5200, with a value for duty assessed at the value of the medium.

These examples suggest that the classification of computing equipment and parts, including related telecommunications equipment and data processing media, is concentrated in the three tariff items of the TSUS that have been noted. A few exceptions to this treatment may exist, including the possibilities of duty-free entry for computing equipment for institutional use under item 851.60; of parts entering under eo nomine items; of certain related telecommunications equipment entering under item 684.64; and of analogue computing equipment entering under items pertaining to scientific instruments. These are likely, however, to account for only a small volume of total United States imports of computing equipment and parts, most of which is represented by imports under the items listed in the previous pages.

The United States International Trade Commission has prepared a concordance of the TSUS with the BTN. The draft concordance tend to substantiate the comparability between Items 676.15, 676.30 and 676.52 in the TSUS, and headings 84.53 and 84.55 in the BTN, in so far as computing equipment and parts are concerned.

International Rates of Duty

The nominal rates of duty for computing equipment and parts for Canada, the United States, the United Kingdom, the E.E.C., Sweden and Japan are presented in Table 3.8. Notable is the proliferation of tariff items applicable to imports into Canada; the other countries, all of whom, except the United States, use the BTN, have only a few tariff items which were designed specifically for computing equipment.

With respect to rates of duty, it is immediately apparent that the nominal level for each country is roughly the same for all product groups. It is also evident that the nominal rates in Canada and Japan range higher than those of the E.E.C. and the other three countries. The average weighted rate of duty paid on all imports of computing equipment into Canada, during the period of the Board's import analysis was, as established earlier, 11.9 p.c., a level clearly much higher than the other nominal rates with the exception of the Japanese. As noted earlier, the average duty paid on Canadian

Table 3.8: Rates of Duty on Computing Equipment and Parts by Product Group for Selected Countries, 1975

Product Group	Country	Tariff Items	Nominal Rates of Duty M.F.N.
Mainframes			
	Canada	41415-1, 69605-1, others[(a)]	10, Free, various
	U.S.A.	676.15	5.5
	U.K.	84.53	8.4
	E.E.C.	84.53	7
	Sweden	84.53	5
	Japan	84.53	13.5[(b)]
Peripherals			
	Canada	41202-1, 41400-1, 42700-1[(c)] 44506-1, 44524-1, 44532-1 44538-1, 69605-1, others[(a)]	10, 20, 15, 17½, 17½, 7½, 12½, Free, various
	U.S.A.	676.15, 676.30	5.5, 5
	U.K.	84.53	8.4, 6, 4.5
	E.E.C.	84.53	7
	Sweden	84.53	5
	Japan	84.53	15, 22½, 6, 4[(b)]
Related Telecommunications Equipment			
	Canada	44506-1, 44508-1, 44524-1, 69605-1, others[(a)]	17½, 17½, 17½ Free, various
	U.S.A.	676.30, 676.52, 684.64	5, 5.5, 7
	U.K.	84.53	8.4
	E.E.C.	84.53	7
	Sweden	84.53	5
	Japan	84.53	22½[(b)]
Parts			
	Canada	41202-1, 41405-1, 41415-1, 42700-1[(c)], 44506-1, 44508-1, 44524-1, 44532-1, 44538-1, 44539-1, 46200-1, 69605-1, others[(a)]	10, 7½, 10, 15, 17½, 17½ 17½, 7½, 12½, Free, 15, Free various
	U.S.A.	676.52	5.5
	U.K.	84.55	8.4, 6, 4.5
	E.E.C.	84.55	6
	Sweden	84.55	5
	Japan	84.55	15

(a) See Tables 3.1, 3.2 and 3.3.
(b) Certain Japanese duty rates are temporary.
(c) Tariff Item 42700-1 has provision for duty remission.

Source: The published tariff schedules of the indicated countries.

computing imports is lower than indicated above when remission and drawback of duties are taken into consideration; similar relief from duties payable is available in the other countries as well. The average level of duty paid by the other countries on their imports of computing equipment and parts was not studied by the Board, but it is likely that this level, after allowing for remission, drawback and other exemptions from duties payable, is lower for the other countries, with the exception of Japan, than it is for Canada.

SUMMARY

The present tariff structure relating to the importation of computing equipment and parts into Canada is one of complexity. A large number of tariff items are used to classify this equipment, and several give rise to uneven tariff administration. None of the tariff items is well-suited to the classification of the equipment and parts under review, and no single tariff item has been designed specifically and exclusively for computing equipment. Identical or very similar units of equipment may be classified under a number of tariff items. These and other factors have tended to result in a tariff treatment which, over-all, can be described as inconsistent and cumbersome.

Although the Board has identified 63 relevant tariff items, only 15 have more than 5 per cent of their imports consisting of computing equipment and parts. Eight of the 63 identified tariff items accounted for 98 per cent of all relevant imports. These imports entered at rates of duty ranging from free to 25 p.c., with the largest volume, some 48 per cent of imports, entering at a rate of duty of 15 p.c. The average rate of duty on all these imports was 11.9 p.c. The effect of the duty remission under the Machinery Program with respect to Tariff Item 42700-1, however, was to reduce this average rate of duty to 8.9 p.c.

Duty drawbacks on imported parts which are subsequently exported in the form of finished products, played a significant role in reducing the average weighted rate of duty on these parts from 11.5 p.c. to 0.5 p.c.

A comparison of the tariff treatment of computing equipment and parts by Canada and by certain other countries indicates that nominal rates are higher in Canada than in the other countries compared, except Japan. In large measure the relevant equipment and parts have been specified and enumerated in the tariffs of other countries, usually in not more than two or three tariff items.

CHAPTER IV: THE MARKET AND THE INDUSTRY IN CANADA

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CHAPTER IV: THE MARKET AND THE INDUSTRY IN CANADA

This chapter examines the market for and the production of computer hardware in Canada. Its purpose is to describe the size and characteristics of the market and to indicate the types of products manufactured, their production value, and the nature of the companies involved in their manufacture and supply. In the course of this description the Board has found it useful to segregate computing equipment into four main groups: mainframes, peripheral equipment, related telecommunications equipment and parts, components and subassemblies. This classification has also been used to describe the producers and suppliers of computer hardware. On occasion, however, the discussion is centred upon computer systems, that combination of finished products noted in Chapter II comprising mainframes, peripheral equipment and related telecommunications equipment; for it is in this form that computer products are most often supplied to the market.

The chapter begins with a brief review of some of the developments in the computer hardware industry. It then discusses the market in Canada for computing equipment from several viewpoints, and various measures of the market are described and quantified. The discussion continues with an identification and description of the suppliers of computing equipment in Canada which supply systems and units of equipment to the Canadian market, and of the suppliers of parts used in the production of finished goods. Attention is then directed to the production of computing equipment in Canada, and an assessment is made as to the value of production and the types of products manufactured. The producers of computing equipment in Canada are identified and a small number of firms producing parts, components and subassemblies for the computer hardware industry are noted. Two factors of significance are then discussed: employment in the industry and research and development activities. The chapter concludes with a brief summary of the basic findings.

At this point it should be noted that suppliers and producers are frequently one and the same, performing both functions within a corporate entity. The exceptions are agents and distributors which are engaged solely in the supply function. The distinction is used as a convenience to describe those companies engaged directly in the production of computing equipment as contrasted to those having a direct interaction with the market.

THE DEVELOPMENT OF THE INDUSTRY

The production and marketing of computers emerged as a significant economic activity less than 30 years ago. During that short timespan it has developed into a major world industry. It has been suggested that three interrelated factors have been important in this development: rapid technological advances; co-operation between users and manufacturers to develop new programming languages and new uses for computer equipment; and competition and specialization among manufacturers of this equipment. Although some observers of the industry might take issue with the choice of one or more of these factors, or might prefer to add others, there is no doubt that they broadly represent the most significant forces at work during the period and are largely responsible for the industry's present position.

Advances in Hardware Technology

The main effect of technological advances has been a reduction in cost, along with new and improved data processing capabilities which have resulted in an expanding market for computers and computing equipment. Major technological advances over the years have generally occurred first in components and the effect has spread to computer mainframes, to peripherals and to related telecommunications equipment.

Three major advances in components technology have had a significant effect on the computer industry. First, the advance from vacuum tubes to transistors; second, from transistors to integrated circuits; and third, from integrated circuits to large-scale integration (LSI). Each advance in components technology has resulted in a reduction in the size of computers and an increase in their speed and efficiency. They have thus become less costly to use, while at the same time becoming demonstrably more useful and convenient tools in an increasing variety of industrial, commercial and institutional applications.

The first computers using vacuum tubes to perform the essential switching function were rather bulky.(1) In later models vacuum tubes were replaced by transistors which were not only significantly smaller in size but had greater reliability. Smaller, more efficient switches speeded up switching time. Integrated circuits gave rise to a building-block approach in the manufacture of computers, resulting in major advances in assembly processes, and facilitating the easier maintenance of computer systems. The latest computers use microminiaturized semiconductor devices for memory and other electronic circuits, in many instances replacing the integrated circuits that were "state-of-the-art" in the very recent past. As a result of microminiaturization, the smaller computers now available have the same capabilities as the much larger machines of a few years ago.

As computers became faster and more compact, they could not be used at full capacity until more versatile peripheral devices and data communications technology were developed. In peripherals, there were notable advances in the speed and density of storage in both magnetic tape and disk devices. New methods of printing were developed, and the speed of printers increased significantly. Many types of terminals were developed for use as input/output devices, as enquiry stations, and for many special applications. In data communications, the increasing use of terminals in remote locations brought about the need for faster and more reliable devices of the types mentioned in connection with related telecommunications equipment in Chapter II. Thus, the developments in certain types of computer hardware resulted in the need for advances in other types. In many instances, the technological advances in one product area have been put to use and enhanced in others.

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(1) Switching circuitry is the basis of computer logic; a switch has two positions, either on or off, and a number of switches can be combined to represent various logical functions. The same logic is used to represent data within the computer memory.

New Software and New Applications

Important as hardware developments were, their impact on users would have been severely constrained but for concurrent developments in software. Without improved software, in the form of new programming languages, computers would have remained relatively unusable by all but an initiated few.

In the early use of computers, after the concept of storing programs internally to control the computer had been established, it was necessary to understand thoroughly the architecture and logic of the computer before a set of instructions could be developed that would enable a specific task to be carried out. This was a laborious process, and required great care. The development of procedural languages such as Fortran, Algol, Basic and COBOL overcame much of the laboriousness previously involved in writing computer programs, since a single keyword could be used to activate automatically a complicated set of calculations by the computer. Beside the fact that less preparation time was required and errors were fewer, the main benefit from these programming languages undoubtedly was that the computer became far less difficult to use, so that an increasing number of persons could take advantage of it without having to acquire a thorough knowledge of the hardware. For the most part, the development was the result of co-operation among manufacturers and users.

The decline in hardware costs was instrumental in expanding the use of computers because it brought prices to within reach of more and more organizations, and greatly expanded the number of computer applications that were economically viable. In turn, the knowledge that a similar organization had applied computer techniques to a particular problem or activity, encouraged other organizations in the same industry to do likewise. Even beyond the same sphere of activity, the knowledge of a successful computer application induced many organizations to determine whether the application might be of benefit to them. By giving wide exposure to the immense variety of computer applications in existence, the hardware suppliers helped to expand the demand for their equipment.

Competition and Specialization

Competition among an increasing number of firms seeking to share in the growth of this rapidly expanding new industry had the effect of accelerating the development of new products and new applications. Many firms, in an effort to attract new customers or to change the brand allegiances of experienced users, introduced systems and devices with increased operating speeds and capacities, and with better price/performance ratios than existing models. The very largest firms, such as IBM, Honeywell Information Systems, Sperry Univac, and Burroughs could afford to provide a wide variety of computer systems and products, but for most other companies the rapidly evolving technology led to system or product specialization. Digital Equipment Corporation and Data General Corporation chose to specialize mainly in the production and marketing of minicomputer systems, whereas the Control Data Corporation chose to specialize mainly in large-scale systems.

Specialization in the production and marketing of peripheral equipment also occurred. The independent peripheral manufacturers, lacking the resources of the large manufacturers of systems, concentrated their efforts on usually not more than one or two peripheral products, such as disk or tape drives or data entry devices. These were sold directly to users, for the most part, in competition with the products of the computer system suppliers and the products of the other independent companies. Their entry into the peripheral equipment market tended to intensify its competitiveness because their products were generally innovative, and their prices were generally lower than those of the systems suppliers for equivalent products.

Most of these developments - the advances in hardware technology, the development of new software and new applications, and the competition among manufacturers - occurred mainly and often initially in the United States. As many of the participants were already active internationally, the developments spread rapidly to other industrialized countries. In Canada, there were a number of developments that commenced in the 1950s at universities and in small, domestically owned enterprises. Foreign-owned companies were also responsible for a number of Canadian developments. A noteworthy example was the Ferranti-Packard FP6000 general-purpose digital computer system.[(1)] In terms of hardware developments by Canadian-owned companies, the Key-Edit data entry system by Consolidated Computer Inc., and the SP-1 electronic switching system by Northern Telecom, were perhaps the foremost examples, but only the first was regarded as being within the mainstream of data processing hardware. In terms of the totality of computing activity, the Canadian role tended to be more heavily weighted towards the provision of computer services and the use of computers, than to their manufacture.

THE MARKET FOR COMPUTING EQUIPMENT

The Canadian market for computing equipment is very largely furnished by imports. In a complementary manner, most of the output of domestic production of computing equipment is exported. This fundamental relationship, which will be substantiated below, has existed since the latter half of the 1960s when the foreign-owned manufacturers in Canada began to rationalize their production on a continental or larger scale. The concept of rationalized production will be examined later in this chapter; it is sufficient to note here that, because the products manufactured in any one location are destined to meet the combined needs of a number of national markets, only a very small portion of production is retained for the Canadian market. The value of imports of finished products, therefore, is very largely a measure of market demand in Canada.

Market Estimates

The market for computing equipment in Canada in 1972 was estimated at $358.0 million at the manufacturer's level. This derived figure is based on a value of shipments of $206.4 million, plus imports

(1) See Branching Out, Report of the Canadian Computer/Communications Task Force, Department of Communications, Ottawa, May 1972, p. 14.

of $337.6 million, and minus exports of $186.0 million. The market for parts alone was estimated at $118.9 million at the manufacturer's level, thus indicating a market for finished products, i.e., mainframes, peripherals and related telecommunications equipment, of $239.2 million at the manufacturer's level. Shipments of finished products amounted to $172.5 million, while imports and exports of equipment totalled $223.3 million and $156.6 million respectively. Statistics Canada import and export figures and Tariff Board surveys are the sources of the values indicated.

It is readily apparent that most of the output of domestic production is exported and the most of the domestic requirements are imported. This is indicative of a very high degree of rationalization in the production of computer hardware. Moreover, in view of the dominant position of U.S.-owned subsidiaries of multinationals in the Canadian industry, both as producers and suppliers, it is clear that the Canadian industry supplies a market, and is part of an industry, that is continental and even global.

Estimates of the Canadian market at the manufacturer's level for computing equipment by product group for 1972 are shown in Table 4.1. The value of mainframes was estimated at $75.5 million or 31.6 per cent of the market; the value of peripheral equipment was estimated at $156.3 million or 65.3 per cent; and the value of related telecommunications equipment was estimated at $7.4 million or 3.1 per cent of the market for finished products. The Board believes that the figures relating to shipments, imports and exports, and hence, the market, reflect the situation that prevailed in 1972. Some difficulty, however, was experienced in determining the true value of shipments. It appears that most companies add a mark-up to their costs of production either before products leave the factory, or at some point in the transfer of products from the factory to their marketing organization, or to the customer. The variations in both the practice and the magnitude of the mark-up makes it difficult to ensure the desired accuracy in terms of the value of shipments. Nevertheless, Table 4.1 demonstrates the fundamental relationship referred to at the beginning of this section, viz., that imports bear a close relationship to the market, and that shipments (production) bear a close relationship to exports.

Table 4.1: The Estimated Market for Computing Equipment in Canada by Product Group, 1972

Product Group	Shipments	Imports	Exports[a]	Market[b]
		- $ million -		
Mainframes	12.5	64.9	1.9	75.5
Peripherals	157.2	153.7	154.6	156.3
Related telecom. equipment	2.8	4.7	0.1	7.4
Total Finished Products	172.5	223.3	156.6	239.2
Parts, components and subassemblies	33.9	114.4	29.4	118.9
Total Hardware	206.4	337.6	186.0	358.1

(a) Includes re-exports.
(b) Market = Shipments + Imports - Exports.

Source: Tariff Board; Statistics Canada.

Although trend data were not available for the market as a whole, the Board considers that most of Canada's computing equipment requirements have been met by imports, particularly the imports of finished products. These represent, therefore, a reasonable approximation of Canadian market demand and their growth, in turn, represents an adequate indicator of the growth of the domestic market. Imports of finished products for the years 1971 to 1974 have been estimated in Table 7.2. They are shown here, in Table 4.2, to indicate the approximate values of the Canadian market at the manufacturer's level in lieu of other market estimates.

Table 4.2: Estimated Canadian Imports of Finished Computer Products by Product Group, 1971 to 1974, as an Indication of the Trends in the Canadian Market

Product Group	(Values at the manufacturer's level) 1971	1972	1973	1974	Average Annual Rate of Growth, 1971-1974
	- $ million -				%
Mainframes	56.2	64.9	84.5	101.7	21.8
Peripherals	129.0	153.7	168.6	204.2	16.5
Related telecom. equipment	4.0	4.7	6.1	7.3	22.2
Total	189.2	223.3	259.2	313.2	18.3

Source: Extracted from Table 7.2.

The lower average annual rate of growth in peripherals relative to the other product groups, may be due to higher-than-average peripheral equipment imports in 1971 and 1972. By 1973 and 1974, the ratios had reverted to the more usual one-third mainframes, two-thirds peripherals. The relatively higher average annual rate of growth in related telecommunications equipment suggests an increasing use of data communications during the period.

Thus far, the discussion of market estimates has been confined to values of computing equipment traded at the manufacturer's level. Most manufacturers, however, particularly the firms which dominate the market, are also suppliers. They supply computing equipment directly to users at the retail level. At this level, in terms of value, the market is much larger. Several factors account for the difference in mark-up between the manufacturing and retail levels, including: software, marketing support services, installation, duties and taxes, promotion, administration, plus a profit factor. Certain rental prices include not only the foregoing elements, but also the cost of maintenance service.

The Board obtained data relating to retail list prices of typical systems and units of equipment installed in Canada, as well as their costs at the manufacturing level. Although the differences between the two levels varied from company to company, and from system

to system even within the same company, the hardware costs at plant level constituted on average, about 40 per cent of retail prices (excluding provincial taxes). The Board has used this average in estimating the value of the over-all market for finished products at the retail level, by applying this ratio to the values of imports in Table 4.2. The results are shown in Table 4.3.

Table 4.3: Estimates of the Canadian Market for Finished Computer Products by Product Group, 1971 to 1974

(Values at the retail level)

Product Group	1971	1972[(a)]	1973	1974
		- $ million -		
Mainframes	140.5	162.3	211.3	254.3
Peripherals	322.5	384.3	421.5	510.5
Related telecom. equipment	10.0	11.8	15.3	18.3
Total	473.0	558.4	648.1	783.1

(a) To maintain the consistency of the table, the Board has used imports in 1972 as the basis for calculating the retail market values. Under other circumstances, the Board would have used the market value at the manufacturer's level in Table 4.1 as the basis for this calculation of the 1972 market. Using this base, the 1972 market value is estimated at $598 million.

Source: Table 4.2.

It is probable that the difference between manufacturing and retail levels varies among product groups. It is believed, for example, that the difference is greater in mainframes than in peripherals and related telecommunications equipment. This would alter the values by product group, but not the total values. The total values represent the revenues accruing to computing equipment suppliers. Although the average annual rate of growth of the market, at 18.3 per cent during the 1971 to 1974 period, is very high, it will be seen in Chapter VII that this rate of growth is by no means exceptional by comparison with the industry in other countries.

Structural Aspects of the Market

In the previous section, estimates of basic market data were provided. Although these gave a clear indication of the total size of the market in recent years, and of the composition of sales by product groups with their average annual rates of growth, there are several other aspects of the Canadian computer hardware market that are worthy of examination and comment.

In order to view the market from a structural perspective, i.e., the size of system, type of user, and regional dispersion, the Board turned to data collected and published by the Canadian Information Processing Society (CIPS) in its annual census, which provides historical comparisons, as well as the particular data needed for structural analysis.

The basic unit of information of the CIPS census is the computer system. As noted previously, this comprises a computer mainframe, units of peripheral equipment and related telecommunications equipment if the system has a teleprocessing capability. Although the census data have certain limitations,[1] the Board has sufficient confidence in their validity to use them in order to assess the growth in the accumulation of computer systems in Canada, and their distribution by size of system, by types of users, and by province. The Board also used international comparisons of the value of computer system installations to obtain a measure of the relative size of the Canadian market.

Growth in the Number and Value of Installations

The first installation of a commercial computer in Canada was made in 1956, two years after the first such installation in the United States.[2] By 1968, there were 1,613 computer systems in use, by the beginning of May 1973 the total had risen to 5,736, an average annual rate of growth of almost 29 per cent.

The value of computer installations (as distinct from their numbers) was estimated at $1,530 million in 1973, twice the level of $752 million estimated for 1968. The average annual rate of growth between 1968 and 1973 in the value of installations was 15.3 per cent. This is some 3 percentage points lower than the average annual rate of growth for imports of finished computer products as estimated in Table 4.2 for the 1971-1974 period. The difference appears to be due to equipment unreported by CIPS.

The relatively more rapid rate of growth from 1968 to 1973 in the number of installations, as shown in Table 4.4, is due to the fact that large numbers of mini-computers of relatively low price or rental value, have been installed in Canada in recent years. About 71 per cent of the additional installations between 1968 and 1973 has been at the lower end of the value scale. The number of computer systems installed, therefore, has increased more rapidly than their dollar value. The large expansion in the number of installations is significant of the increasing acceptability of data processing methods. The

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(1) Among the limitations of CIPS Computer Census, the Board would include the following: 1. There may be some underestimation of the total number of installations due to the voluntary nature of the reporting. CBEMA believed this to be in the order of 5 to 7 p.c. Tariff Board Transcript, Vol. IV, p. 422. 2. Certain equipment such as stand-alone peripherals, data entry systems and related telecommunications equipment, may well remain unreported in the total value of reported installations. 3. Rental, purchase and lease values are not reported by installation because of confidentiality constraints. Summary tables are provided, however, with numbers of installations by supplier, and by value categories. 4. The CIPS census data represent the stock of systems in the hands of users. The year-to-year increase represents net sales/rentals/leases only, and not total sales. 5. The reported values are at or near the retail level of trade, and they, therefore, encompass other factors in addition to the reported hardware.

(2) CBEMA brief, p. 26.

lesser growth in the value, combined with the shift in their size, suggests that the technological advances referred to at the beginning of the chapter have permitted the industry to supply computer systems and devices to a wider spectrum of users and at lower prices.

Table 4.4: Number and Value of Computer Installations in Canada, 1968 to 1973[(a)]

Year	Number: Total Installations	Number: Year-to-Year Change	Annual Rate of Growth
	No.	No.	%
1968	1,613		
1969	2,037	424	32.5
1970	2,700	663	32.5
1971	3,548	848	31.4
1972	4,406	858	24.2
1973	5,736	1,330	30.2
	Value		
	- $ million	-	%
1968	752		
1969	940	188	25.0
1970	1,150	210	22.3
1971	1,295	145	12.6
1972	1,390	95	7.3
1973	1,530	140	10.1

(a) Comparable data are not available for 1974 because information on mini-computers, included in prior years, was no longer requested as of the 1974 census. Value estimates for 1968-70 were calculated by the Tariff Board; and for 1971-73, by the International Data Corporation.

Source: Canadian Information Processing Society, Annual Computer Census, Whitsed Publishing Limited, Toronto, 1968-1973; EDP Industry Report, International Data Corporation, Newtonville, Mass., Dec. 17, 1971 and Aug. 2, 1974; Briefing Session, International Data Corporation, New York, N.Y., May 11, 1972.

From the standpoint of the user there are a variety of factors that affect the demand for data processing equipment, and by implication, the growth of the computer hardware market. In general the initial decision to use a computer is based either on the expectation that its use will result in increased efficiency and effectiveness or that its use is essential, there being no other known method of performing the task. In the first instance computers have become very important in efforts to reduce operating costs, as well as to provide more comprehensive and more timely information on which to base operating decisions. In the second instance, their indispensability has been demonstrated in such tasks as space flights and atomic physics calculations; they have become almost indispensable in such applications as airline reservation systems, air traffic control and in certain

banking systems. The advances in technology, however, have tended to create their own demands for data processing equipment in the sense that reductions in price have enabled more users to undertake applications that would not have been cost-effective two or three years earlier.

At the same time, there is no doubt that market growth is also affected, in the short term at least, by general economic conditions. In 1970-1971, there was a pause in growth and the industry underwent a retrenchment.(1) During this period, the level of user data processing activity declined, and it was noticeable that data processing installations were not immune to cost-cutting by business managements. Future market growth, therefore, will be dependent on the continuation of the factors that have led to its present size, although general economic conditions may be expected, from time to time, to modify or interrupt the growth trend experienced by this industry.

The Changing Nature of Computer Installations

Computer installations that have exhibited the highest rates of growth between 1968 and 1973 are those in the small- and large-sized categories. The market for intermediate-sized systems has also grown since 1968, but at a less rapid rate than that for small and large systems.

The number and estimated value of computer systems installed in Canada by size classifications(2) in 1968 and 1973 are shown in Table 4.5. It reflects substantial changes in the computer market. By 1973, the proportion of smaller installations, those with a monthly rental value of less than $2,000, had increased sharply, while the very large installations, those renting for $50,000 per month and over, increased their share only slightly from 2.3 per cent in 1968 to 2.5 per cent in 1973. The proportion of all installations in all other intermediate-sized categories declined.

As might be expected, the distribution by rental category of the value of computer systems installations varies greatly from that of the number of installations. The estimates of value of installations by rental category in Table 4.5 indicate that a very small number of large systems account for a large share of the total value of all installations. Computer systems, in the rental value category of $50,000 per month and over, accounted for 31 per cent of the value of all installations in Canada in 1973, compared with 19 per cent five years earlier. Furthermore, of the estimated increase of $778 million in the value of all installations between 1968 and 1973, $332 million or 43 per cent was accounted for by the largest systems. In 1973, computer systems with a monthly rental value in excess of $20,000, although comprising just 7 per cent of the total number of installations, nevertheless represented 56 per cent of the value of total installations. On the other hand, the two smallest-sized categories which comprised 57.6 per cent of the number of installations in 1973,

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(1) See, for example, Branching Out, Report of the Canadian Computer/Communications Task Force, Department of Communications, Ottawa, May, 1972, p. 65.

(2) The Board accepted monthly rental value as an approximate measure of the size of a computer system. Thus, Table 4.5 shows the size of systems in terms of ranges of monthly rental value.

had only 7 per cent of the value.[1] The proportion of the value of all installations accounted for by these small computers has increased, however, from 3.4 per cent in 1968. This reflects, as in the case of the largest installations, their increasing prominence in the total number of installations. The proportion of the value of total computer installations in the intermediate rental value categories either remained the same or declined.

There are, of course, many possible explanations for the changing nature of the installations described above. Although the technological advances referred to previously have played a large role, they do not explain the growth in the very large computer systems category. This, the Board believes, is attributable to the needs generated by large corporations and institutions for very large and very fast computing facilities capable of servicing networks of remote terminals and small satellite computers. This kind of capability requires a minimum size of computer system which, up to the present time, has meant one encompassed by the very large category. Given the propensity for centralized networks of this type to grow larger and to be subject to increasing workloads, it is probable that the relatively higher growth in the very large category of installations will continue in the near term.

The remarkable growth in the smallest sizes of installations is due undoubtedly to the combination of factors referred to in terms of the development of the industry at the beginning of this chapter. Through their lower costs they have become widely accepted, and most are inexpensive enough to be used for dedicated tasks. At the same time, they have many of the capabilities of even the medium-sized systems of a few years earlier, hence the relative decline of computer installations in the middle range. This trend is likely to be accentuated in the future.

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(1) The data are in general agreement with 1971 estimates made by CBEMA at the public sittings (see Transcript, Volume I, page 108). CBEMA indicated that 9 per cent of computers renting for more than \$20,000 per month accounted for 55 per cent of revenues, and that 82 per cent of installations renting for less than \$10,000 per month accounted for 28 per cent of revenue. Comparable figures from the Board's estimates for 1973 would be 86 per cent of installations renting for less than \$10,000 per month accounted for 28 per cent of revenues, and 7 per cent over \$20,000 accounted for 56 per cent of revenues.

Table 4.5: Number and Estimated Value[a] of Computer Installations in Canada, by Monthly Rental Value Range 1968 and 1973

Monthly Rental Value	Number of Computer Installations 1968	Number of Computer Installations 1973	Per Cent of Total 1968	Per Cent of Total 1973	Average Annual Rate of Growth, 1968-1973
$	No.	No.	%	%	%
Up to 1,000	369	2,448	22.9	42.7	55.0
1,000 to 1,999		856		14.9	
2,000 to 4,999	504	1,127	31.3	19.6	17.5
5,000 to 9,999	318	529	19.7	9.2	10.7
10,000 to 19,999	249	373	15.4	6.5	8.4
20,000 to 49,999	136	259	8.4	4.5	13.7
50,000 and Over	37	144	2.3	2.5	31.2
Total	1,613	5,736	100.0	100.0	28.8

	Number of Computer Installations		Per Cent of Total		Average Annual Rate of Growth, 1968-1973
	$ million		%	%	%
Up to 1,000	25.5	51.4	3.4	3.4	32.8
1,000 to 1,999		53.9		3.5	
2,000 to 4,999	81.1	165.7	10.8	10.8	15.4
5,000 to 9,999	109.7	166.6	14.6	10.9	8.7
10,000 to 19,999	171.8	235.0	22.9	15.4	6.5
20,000 to 49,999	219.0	380.7	29.1	24.9	11.7
50,000 and Over	144.7	476.6	19.2	31.1	26.9
Total	751.8	1,529.9	100.0	100.0	15.3

(a) Values calculated by the Tariff Board.

Source: Canadian Information Processing Society, Annual Computer Census, Whitsed Publishing Limited, Toronto, Ont., 1968, 1973.

Computer Installations by Province

The number of computer system installations by province was obtained from the CIPS computer census for 1968 and 1973. The provincial shares of installations by value were unavailable for these years, but as a rough basis for comparison with the number of installations, the Board has used the shares of value estimates for 1971 contained in Branching Out, Report of the Canadian/Computer Task Force, Department of Communications. These figures are shown in Table 4.6.

More than 70 per cent of all installations in 1973 were located in the Provinces of Ontario and Quebec; Ontario accounted for 49 per cent, and Quebec 22 per cent of the total number. The market for computer hardware appears, therefore, to be largely concentrated in those two provinces. The proportion of the number of installations in Ontario is higher than might be expected on the basis of population,

or employment, because it includes the installations used by the federal government in Ottawa. The prominence of Ontario and Quebec in terms of the number of installations has, however, diminished slightly between 1968 and 1973. Nevertheless, judging from the 1971 provincial distribution of value, Ontario and Quebec accounted for disproportionate shares, indicating that the installations in these provinces tend to be larger than average. This seems reasonable in the light of the concentration of corporate headquarters, of large service bureaux, and of large institutional users in these provinces.

In terms of the number of installations elsewhere in Canada, there has been a relative decline in Manitoba and Saskatchewan. The other provinces, particularly Alberta and British Columbia, increased their shares of the number of computer systems installed in Canada between 1968 and 1973.

Table 4.6: Number of Computer Installations in Canada by Province, 1968 and 1973, and Provincial Shares of the Value of Installations, 1971

Province	Computer Installations 1968	Computer Installations 1973	Share of Number 1968	Share of Number 1973	Average Annual Rate of Growth, 1968-73	Share of Value Estimates 1971 [a]
	No.	No.	%	%	%	%
Alberta	119	501	7.4	8.7	33.3	6.9
British Columbia	107	499	6.6	8.7	36.1	6.4
Manitoba	69	223	4.3	3.9	26.4	4.4
New Brunswick	16	90	1.0	1.6	41.4	1.0
Newfoundland	9	56	0.6	1.0	44.1	0.4
Nova Scotia	31	165	1.9	2.9	39.7	1.4
Ontario	811	2,809	50.3	49.0	28.2	52.2
Prince Edward Island	-	10	-	0.2	-	*
Quebec	410	1,271	25.4	22.2	25.4	25.7
Saskatchewan	41	109	2.5	1.9	21.6	1.5
Northwest Territories	-	1	-	*	-	*
Yukon	-	2	-	*	-	*
Total	1,613	5,736	100.0	100.0	28.9	100.0

(a) Data extracted from Branching Out, Report of the Canadian Computer/Communications Task Force, Department of Communications, Ottawa, Ont., Vol. 1, p. 47.

Source: Canadian Information Processing Society, Annual Computer Census, Whitsed Publishing Limited, Toronto, Ont., 1968, 1973.

In terms of average annual rates of growth in the number of installations during the 1968 to 1973 period, the importance of Ontario, at 28.2 per cent, is reflected in the Canadian average of 28.9 per cent. Most noticeable were the Provinces of Newfoundland and New Brunswick, each with over 40 per cent average annual rates of growth, but the number of systems installed in the base year of 1968 was very small. Alberta, British Columbia, and Nova Scotia were the other provinces exhibiting rates of growth above the national average. Manitoba, Ontario, Quebec, and Saskatchewan were all below the national average. These rates of growth in the number of installations are in contrast to rates of growth in the value of installations, the national average of which was just 15.3 per cent, as noted in Table 4.5.

Computer Installations by User Classifications

Virtually all types and sizes of businesses and institutions employ computers, either in-house or by means of a service bureau, for an immense variety of tasks. The respondents to the CIPS Computer Census are requested to classify themselves on their returns to one of a number of industrial classes that most closely describes the type of business or activity in which they are engaged. The resultant classifications form the basis of the statistics presented in Table 4.7. This shows a breakdown of the number and value of installations in 1968 and 1973 by 12 categories of users, plus a class for those users who could not identify their businesses or activities with any one of the 12 categories. The bulk of the installations in the "other services" classification is understood to be accounted for by educational institutions.

In both 1968 and 1973, the major portion of the value of installations was concentrated in five user classifications: manufacturing, government, service bureaux, other services, and financial institutions. These five classes combined accounted for 72 per cent of the total value of installations in 1973, with manufacturing, government, other services, service bureaux and the financial sector accounting for 17.1, 16.0, 13.6, 13.4, and 12.0 per cent respectively. The combined share of these five classes is essentially the same as in 1968, although the shares held by individual classes have changed substantially. Service bureaux have increased their share sharply, from 8.7 per cent to 13.4 per cent. Government and other services classes have increased their shares also, while the shares of manufacturing and the financial section declined.

The total value of installations doubled from $752 million to $1,530 million during the 1968-1973 period. The five major using industries increased their value of installations from $534 million to $1,102 million, slightly more than a twofold increase. The remaining industries expanded their value of installations from $218 million to $428 million. The most rapid growth in the value of installations was in service bureaux and communications, an average annual rate of growth of 25.2 and 28.1 per cent respectively.

Table 4.7: Number and Estimated Value[(a)] of Computer Installations in Canada by Industrial Classes, 1968 and 1973

	Number				
	Computer Installations		Share of Number		Average Annual Rate of Growth, 1968-73
	1968	1973	1968	1973	
	No.	No.	%	%	%
Primary/Resource	50	154	3.1	2.7	25.2
Construction	29	86	1.8	1.5	24.3
Manufacturing	400	1,407	24.8	24.5	28.6
Transportation	60	247	3.7	4.3	32.7
Utility	80	213	5.0	3.7	21.6
Communications	40	206	2.5	3.6	38.8
Distribution	128	600	7.9	10.5	36.2
Financial	191	384	11.8	6.7	15.0
Other services	243	1,098	15.1	19.1	35.2
Service bureaux	115	359	7.1	6.3	25.6
Government	186	698	11.5	12.2	30.3
Petroleum	77	124	4.8	2.2	10.0
Others	14	160	0.9	2.8	62.8
Total	1,613	5,736	100.0	100.0	28.9

	Estimated Value				
	Computer Installations		Share of Number		Average Annual Rate of Growth, 1968-73
	1968	1973	1968	1973	
	- $ million -		%	%	%
Primary/Resource	16.0	43.2	2.1	2.8	22.0
Construction	5.1	6.8	0.7	0.4	5.9
Manufacturing	146.0	261.6	19.4	17.1	12.4
Transportation	38.8	67.8	5.2	4.4	11.8
Utility	50.4	110.5	6.7	7.2	17.0
Communications	8.3	29.0	1.1	1.9	28.4
Distribution	43.5	94.9	5.8	6.2	16.9
Financial	126.9	183.2	16.9	12.0	7.6
Other services	83.9	208.2	11.2	13.6	19.9
Service bureaux	65.6	204.3	8.7	13.4	25.5
Government	111.8	244.2	14.9	16.0	16.9
Petroleum	47.3	54.9	6.3	3.6	3.0
Others	8.2	21.3	1.1	1.4	21.0
Total	751.8	1,529.9	100.0	100.0	15.3

(a) Values calculated by the Tariff Board.

Source: Canadian Information Processing Society, Annual Computer Census, Whitsed Publishing Limited, Toronto, Ont., 1968, 1973.

Of particular interest is the increase in the estimated value of service bureau installations during the period. This classification concerns a closely related industry, and the absolute value of its installations, combined with the rate of growth, make it of special significance. The high rate of growth exhibited by service bureaux is, in part, a reflection of the high expectations accorded the computer services industry during the 1968 to 1973 period. There were many new entrants to the business, and investment in computing equipment was substantial. It is also a reflection of the demand for computer services by customers who either did not want to install an in-house computer system, preferring not to become involved in the intricacies and staffing needs of computer applications development, or else wanted to complement their in-house installation by obtaining specialized data processing services from a specialist supplier. The services provided by service bureaux, therefore, both complement in-house computer systems and compete with the computing equipment offered by the hardware suppliers, in the sense that the suppliers would otherwise provide the equipment directly to end-users.

In terms of the growth in numbers of installations from 1968 to 1973, there were several industrial classes with average annual rates of growth in excess of 30 per cent. These were communications, distribution, other services, transportation and government. The largest numerical increases were recorded in manufacturing with 1,007, other services with 855, and in government with 512. A few industries, including finance, petroleum and utilities, had a smaller share of the total number of installations in 1973 than in 1968. It is conceivable that a declining share in any one industrial classification could be offset by increased usage of service bureaux.

Table 4.7 does not, of course, reveal the extent to which computer systems have moved into increasingly wider areas of application. The development of faster, more compact and less expensive mini-computers, for example, has facilitated their use in the control of industrial processes. More recently, the emergence of microcomputers at very low prices has the potential for creating entirely new classes of users, such as households. If such a development were to occur, computer installations would no longer be confined to commercial, industrial and institutional users.

The Relative Size of the Canadian Market

The previous sections have served to quantify and describe various measures of the Canadian market for computing equipment. In order to ascertain how large or small the Canadian market is by comparison with other national markets, the Board has used two measures that help to establish this relationship: the estimated value of computer installations in selected countries; and the estimated value of computer installations expressed as a share of the gross national product of selected countries. These are shown in Table 4.8 for the years 1971 and 1973.

In terms of the estimated values of computer installations, Canada ranked seventh in both 1971 and 1973, and in each of those years, accounted for just under 3 per cent of the total value of world-wide installations. In relation to the largest national market, that of the United States, the value of Canadian installations represented about 4.5 per cent of the value of U.S. installations in 1971, and about 5.1 per cent in 1973.

In terms of the estimated values of computer installations as a share of gross national product, Canada ranked third after the United States and the United Kingdom in 1971, and fifth in 1973. Canada, therefore, appears to be one of the foremost users of computers in its pursuit of industrial, commercial and institutional objectives. Nevertheless, the United States remains considerably ahead of all other countries in this respect, demonstrating both the wide acceptance of computers in that market area, and the scope for market growth which exists elsewhere in world markets, including Canada.

The increase in the value of computer installations between 1971 and 1973 shows that the largest growth was, in fact, occurring outside the United States. While installations in the United States increased by $1.04 billion, or 1.8 per cent, the value of all other installations increased by $7.4 billion, or 18.2 per cent. This is too short a time-frame to arrive at definitive conclusions regarding the long-term, particularly in the light of cyclical considerations in recent years. Yet, the magnitude of the gains made elsewhere during the period tends to suggest that the market for computing equipment is relatively more mature in the United States than elsewhere, and that while significant gains will continue to be made in the United States as usage diversifies and expands, even higher rates of growth will continue to be evident in other world market areas.

As far as Canada is concerned, the increase in the value of Canadian installations between 1971 and 1973 at $235 million, or a little over 8.7 per cent, was a modest increase in comparison with that of the majority of countries. Nevertheless, the data in Table 4.8 shows that the Canadian market is significant in world terms, even though both it and other markets outside North America tend to be over-shadowed by the sheer size and dynamic nature of the market for computing equipment in the United States.

SUPPLIERS OF COMPUTING EQUIPMENT

On the supply side of the Canadian market, there are basically three main types of suppliers of finished computing equipment: computer systems suppliers; independent peripheral equipment suppliers; and related telecommunications equipment suppliers. The computer systems suppliers provide a variety of computer systems consisting of mainframes, peripherals and, in one or two instances, related telecommunications equipment. These companies supply the bulk of the computing equipment market, and they are invariably subsidiaries of multinational enterprises, chiefly U.S.-based. The independent peripheral equipment suppliers provide peripherals for attachment to the mainframes provided by the computer systems suppliers, and stand-alone peripherals for use in support of data processing installations. Many of these suppliers are subsidiaries of U.S.-based companies. The related telecommunications equipment suppliers provide this equipment to users of computer systems operating in a teleprocessing mode, and they include both Canadian- and foreign-owned companies. These three types of suppliers engage in trade mainly at the retail level, but some are also involved in trade at a wholesale level.

Table 4.8: Estimated Values of Computer Installations in Selected Countries as Proportions of Their Gross National Products, 1971 and 1973

Country	Estimated Value of Computer Installations End of 1971	Value of Installations as Share of GNP	Estimated Value of Computer Installations End of 1973	Value of Installations as Share of GNP	Increase in Value of Installations 1971-1973
	$ million	%	$ million	%	%
United States	28,900	2.74	29,942	2.31	1.8
West Germany	2,890	1.24	3,772	1.10	14.2
Japan	2,860	1.14	4,922	1.22	31.1
United Kingdom	2,475	1.71	3,231	1.95	14.3
France	2,150	1.25	3,012	1.24	18.3
USSR	1,460	..	2,195	0.40[(a)]	50.3
Canada	1,295	1.39	1,530	1.28	8.7
Italy	1,040	0.98	1,329	1.00	13.0
Netherlands	530	1.33	642	1.09	10.1
Australia	415	1.08	643	1.06	24.5
Sweden	405	1.08	459	1.05[(a)]	13.3
Belgium	355	1.12	338	0.87[(a)]	(4.8)
Switzerland	345	1.34	579	1.43	29.6
Spain	255	0.66	324	0.64[(a)]	27.1
Brazil	250	0.52	330	0.43	14.9
Denmark	175	0.97	388	1.48	48.9
South Africa	145	0.83	233	0.87	26.8
Mexico	130	0.36	150	0.30	7.4
Norway	100	0.76	143	0.75	19.6
All other countries	1,220	..	1,791	..	21.1
Total	47,500	..	55,953	..	8.5
Canada as % of U.S.	4.48	53.57	5.11	55.40	..
Canada as % of Total	2.73	..	2.73	..	..

(a) 1972.

Source: Adapted by the Tariff Board from EDP Industry Reports, International Data Corporation, Newtonville, Mass., December 17, 1971 and August 2, 1974; and from International Financial Statistics, International Monetary Fund, September, 1975.

Although the main types of suppliers noted above provide by far the majority of finished goods to the Canadian market, the supply function is more complicated than the initial description might suggest. There is, for example, some overlap between the types of suppliers, and many are engaged in the marketing of commodities other than those of direct concern to this Reference. There are also three other types of computer hardware suppliers that deal directly with users in the Canadian market. Although not as dominant as the main suppliers, they nevertheless represent either complementary or alternative sources of supply. These are: first, the leasing companies which buy computer systems usually from the computer systems suppliers, and which lease systems or units of equipment to users on a long-term lease; second, the Canadian agents and distributors of systems and units of equipment for those foreign suppliers which are usually too small to establish a direct presence in the Canadian market; and third, the domestic telephone companies which buy related telecommunications equipment from both Canadian and foreign producers, and rent this equipment directly to users.

In addition to selling equipment directly to end-users, at the wholesale level of trade, a number of the firms also supply finished units of equipment to original equipment manufacturers (OEMs). An example would be where a computer systems supplier sells minicomputer mainframes to an independent peripheral equipment manufacturer for incorporation into data entry systems. These same suppliers also provide finished units of equipment as inputs to other industries, as, for example, in the provision of minicomputers for use in aircraft flight simulators. At the present time, trade at the wholesale level for finished computer hardware in Canada is not thought to be very extensive; but as computers and computer products become more widely employed within other types of machines, wholesale trade may become of much greater significance to computer hardware suppliers.

The suppliers of parts, components and subassemblies must be taken into account to complete the supply perspective. These suppliers consist of a number of producers, and a number of parts distributors that obtain parts from Canadian and foreign sources. The parts, components and subassemblies in question are those that are used in the production of finished computing equipment in Canada. Many of these parts, however, are imported directly by the larger finished product manufacturers from foreign affiliated companies, or from foreign parts manufacturers. Much of the trade in parts, therefore, is beyond the reach of the Canadian parts suppliers.

On the basis of information from a variety of sources[(1)], the Board believes that there were about 200 computing equipment and parts suppliers which were active in 1972-1973. Their names, together with certain pertinent information relating to their computer hardware interests, are to be found in Appendix C.

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(1) The sources include membership lists from CBEMA and EIAC; the federal Department of Industry, Trade and Commerce; the Canadian Trade Index; and Canadian Datasystems, various issues.

Computer Systems Suppliers

The essential difference between computer systems suppliers and the independent peripheral equipment suppliers is that the former provides mainframes or central processing units either separately or in combination with their other products, whereas the latter do not. A user or potential user of computing equipment, however, can avoid buying or renting a mainframe from a systems supplier by indirect means, such as dealing with a leasing company, a facilities management firm, or through the use of a service bureau.

In 1972-1973, according to information gathered by the Board, there were 37 firms, including a few Canadian distributors and leasing companies, that were actively marketing computer systems in Canada. The Board estimates that these companies accounted for sales of about $550 million in 1972, or about 92 per cent of total market values at the retail level for computing equipment. Sales data for prior or subsequent years by company were unavailable, so the Board made use of CIPS census data to indicate the growth in market shares of particular suppliers of computer systems. The census data indicate the relative positions of 11 suppliers of computer systems who accounted for almost 95 per cent of the total value of all computer installations in Canada as at May 1, 1973, and almost 94 per cent of the number. These suppliers, together with the number and value of their installations in 1968 and 1973, are shown in Table 4.9.

The proportion of the number of computer installations of particular suppliers changed considerably between 1968 and 1973. It is apparent from the data in the table that the positions of Burroughs, Digital, Datagen and Philips, have improved greatly since 1968. In 1973, those four companies accounted for 45.9 per cent of the number of computer installations, a significant increase from the 15.7 per cent share held by those firms five years earlier.

These changes in market shares are due largely to the upsurge in popularity of smaller computer systems. In general, suppliers which experienced the fastest increase in share and growth in the number of installations were those whose product mix consisted largely of minicomputers, small accounting computers and small general-purpose systems, while those firms whose numerical share and growth increased more slowly, or declined, had a product mix weighted more towards medium- and large-scaled systems.

IBM continued to be the dominant supplier in terms of the number of installations. In 1973, it accounted for 1,458 installations or 25.4 per cent of the total. This represented, however, a sharp decline from the 59.5 per cent share it held five years earlier. Most of the erosion in the numerical market share has occurred since 1970, in large part as a result of the strong demand for the smaller types of computer systems in which IBM had relatively few models until 1973 or 1974.

Burroughs, with 1,042 installations in 1973, moved into second place behind IBM. Its average annual rate of growth in number of installations in the five years prior to 1973 or 56.5 per cent was greater than that of any other firm, and as a result it had 18.2 per cent of total number of installations in 1973 compared with 6.8 per cent in 1968.

Table 4.9: Number and Estimated Value[a] of Computer Installations in Canada, by Supplier, 1968 and 1973

	Number				
	Computer Installations		Share of Total		Average Annual Rate of Growth
	1968	1973	1968	1973	1968-1973
	No.	No.	%	%	%
IBM Canada Ltd.	959	1,458	59.5	25.4	8.7
Burroughs Business Machines Ltd.	110	1,042	6.8	18.2	56.5
Digital Equipment of Canada Ltd.	143	986	8.9	17.2	47.2
Honeywell Information Systems	117	448	7.3	7.8	30.8
Sperry Univac Computer Systems	79	382	4.9	6.7	37.1
Datagen of Canada Ltd.	-	380	-	6.6	..
Philips Electronics Industries Ltd.	-	222	-	3.9	..
Hewlett-Packard (Canada) Ltd.	-	185	-	3.2	..
NCR Canada Ltd.	37	152	2.3	2.6	32.7
Control Data Canada Ltd.	73	70	4.5	1.2	0.9
Xerox of Canada Limited	-	45	-	0.8	n.a.
Others	95	366	5.8	6.4	31.0
Total	1,613	5,736	100.0	100.0	28.9

	Value				
	Computer Installations		Share of Total		Average Annual Rate of Growth
	1968	1973	1968	1973	1968-1973
	- $ million -		%	%	%
IBM Canada Ltd.	537.5	878.1	71.5	57.4	10.3
Honeywell Information Systems	47.4	146.9	6.3	9.6	25.4
Sperry Univac Computer Systems	36.1	145.3	4.8	9.5	32.1
Burroughs Business Machines Ltd.	21.1	76.5	2.8	5.0	29.4
Control Data Canada Ltd.	28.6	59.7	3.8	3.9	15.8
Digital Equipment of Canada Ltd.	9.8	59.7	1.3	3.9	43.5
NCR Canada Ltd.	15.0	33.6	2.0	2.2	17.5
Xerox of Canada Limited	-	24.5	-	1.6	..
Datagen of Canada Ltd.	-	13.8	-	0.9	..
Hewlett-Packard (Canada) Ltd.	-	9.2	-	0.6	..
Philips Electronics Industries Ltd.	-	7.6	-	0.5	..
Others	56.4	75.0	7.5	4.9	5.9
Total	751.8	1,529.9	100.0	100.0	15.3

(a) Value of installations estimated by the Tariff Board.

Source: Number of installations and per cent of value obtained from Canadian Information Processing Society, Annual Computer Census, Whitsed Publishing Limited, Toronto, Ont., 1968, 1973.

The number of installations by Digital Equipment increased at an average annual rate of 47.2 per cent, or only slightly less rapidly than that by Burroughs. Its number of installations rose to 986 from 143 five years earlier and represented 17.2 per cent of total installations in 1973 compared with 8.9 per cent in 1968. Very high rates of growth in the number of computer systems installed in recent years were also made by Philips and Datagen.

In terms of value of installations, all major firms, except IBM, increased their market share during the five-year period from 1968 to 1973. Nevertheless, IBM was still the dominant supplier, although its share of the value of installations fell from 71.4 per cent in 1968 to 57.4 per cent in 1973. Its nearest competitor, Honeywell, had installations with an estimated value of $146.9 million by 1973, or just one-sixth the value of IBM's $878.1 million.

Most of the computer systems suppliers in Canada are subsidiaries of foreign-owned companies with headquarters located mainly in the United States. The types and ranges of computer systems offered by these companies in Canada are usually the same as those offered elsewhere. In general, there is virtually no lag between the time the equipment is first introduced and the time that it is offered for sale in Canada. It has been suggested that this allows Canada to benefit from the latest computer technology that is available anywhere despite the absence of Canadian-owned enterprises in all stages of the development, manufacture and sale of computer systems.

Peripheral Equipment Suppliers

Apart from the 37 computer systems suppliers which provided peripheral equipment either as part of their systems or as separate units in 1972-1973, the Board believes that there were another 75 firms actively engaged in the supply of peripheral equipment in Canada at that time. These independent peripheral equipment suppliers consisted of 34 Canadian-owned companies which were mostly agents and distributors for peripherals of foreign manufacture, and 41 foreign-owned companies which were very largely the Canadian sales subsidiaries of U.S. independent peripheral equipment manufacturers.

The Board has estimated that the sales of the 75 independent peripheral equipment suppliers in 1972 were about $36 million, or about 6 per cent of total value of the computing equipment market at the retail level. The average revenue per firm derived from sales of this equipment was slightly less than $500,000, but many of the companies also marketed unrelated products, such as office and photographic equipment. It is believed that the independent suppliers of peripherals have since improved their share of the total market, and that their sales are growing at a slightly higher rate than the market as a whole.

The Canadian-owned agents and distributors tend to market a variety of peripheral products from a number of foreign manufacturers. Some distributors may represent 12 or more manufacturers in the Canadian market, and the product lines are either complementary or unrelated. A few Canadian-owned peripheral equipment suppliers also manufacture the products which they provide, and in these instances they tend to concentrate their efforts on not more than two or three products.

In contrast to the Canadian-owned agents and distributors, the foreign-owned subsidiaries of the independent peripheral equipment manufacturers usually offer only the range of equipment manufactured and supplied by the parent company. The range tends to be limited to specific types of peripherals such as data entry systems, or add-on memory units, or magnetic tape and disk drives.

The independent peripheral equipment suppliers, whether Canadian- or foreign-owned, generally do not have an extensive marketing network throughout Canada. Most of the firms focus upon particular geographical markets, such as Toronto-Ottawa-Montreal, or Vancouver-Calgary-Edmonton. This seems to be confirmed by the fact that less than one third of the 75 independent suppliers have offices, including a head office, in two or more locations in Canada. The computer systems suppliers, in contrast, generally have offices in every large city and in most provinces.

Related Telecommunications Equipment Suppliers

The Board identified at least 21 companies that were actively engaged in the supply of related telecommunications equipment in Canada in 1972. Of these suppliers, thirteen were Canadian-owned companies, and eight were foreign-owned. The majority of the Canadian-owned suppliers were agents and distributors of mostly U.S.-manufactured related telecommunications equipment, but four produced this type of equipment in Canada. The eight foreign-owned suppliers were subsidiaries of producers located mainly in the United States. These 21 suppliers were those that were most closely identified with the supply of related telecommunications equipment.

The nature of this equipment can render its segregation from other types of computing equipment difficult. Communications processors and message concentrators, for example, may be special types of small computer systems, or minicomputers that have been adapted to communications processing. It would not be incorrect, therefore, to include certain systems suppliers in any listing of related telecommunications equipment suppliers. Moreover, at least one computer systems supplier is known to provide separate modem units; and other types of modems are now being incorporated in the data communications terminal of the product lines of other suppliers of computer systems.

There is a further complication involved in the supply of this equipment inasmuch as the telephone companies in Canada also provide certain products included in this category. In most instances, they act as distributors for equipment purchased from the four Canadian producers noted above, but they also import equipment from foreign manufacturers to supply some of the Canadian market requirements. The involvement of the telephone companies is of importance to the smaller Canadian suppliers particularly, because it tends to overcome the need for a sales and service network. In reality, therefore, there are more suppliers of this equipment than the 21 companies the Board has identified; the systems suppliers and the telephone companies are also involved, but the extent of their market participation remains in doubt.

The market value at the retail level for related telecommunications equipment has been estimated by the Board to amount to about $12 million in 1972, or about 2 per cent of the total market value for all computer hardware in that year. The average revenue per firm for the 21 identified suppliers therefore amounted to about $570,000 in 1972, but even this low figure is undoubtedly overstated in view of the market participation by the systems suppliers and telephone companies. It can be explained, however, by the fact that many of the companies do not rely solely on this equipment for their total revenues, but also supply other communications and electronics products to other markets in Canada.

Parts Suppliers

There are two types of suppliers that provide parts, components and subassemblies to the open market in Canada. These are the producers of parts, and the distributors of both imported and Canadian-made parts. Information gathered by the Board indicated that there were 63 producers in Canada, in 1972, of parts that could be used in the manufacture or assembly of finished computer products, and these producers are listed in Appendix C. Some 34 parts producers are Canadian-owned firms, and the remainder are mainly subsidiaries of U.S. companies. However, the extent to which the parts produced in Canada are relevant to, or are actually used by the computer hardware industry is open to question. On the basis of the evidence available, it appears that only a very small proportion of Canadian-produced electronic parts is used by computer hardware manufacturers in Canada. Other less critical parts of a non-electronic nature, such as metal housings, may well be purchased from Canadian parts producers to a much greater extent. The bulk of the parts producers' output, particularly electronic parts, is believed to be used in home entertainment and communications products.

The Board has not attempted to identify all of the parts distributors in Canada because the major portion of their sales is also believed to be derived from industries other than computer hardware. Some of the parts distributors are subsidiaries of U.S. parts manufacturers, such as Motorola and Fairchild Semiconductor; others are subsidiaries of U.S. parts distributors, such as Hamilton-Avnet, Cramer Electronics, and Sweber Electronics. There are also a number of Canadian-owned parts distributors, including Cesco Electronics, Payette Radio, and Wackid Radio. It is understood that the manufacturers of computing equipment in Canada generally obtain parts from distributors in only three circumstances: when the quantities involved are sufficiently small that the advantage in buying directly from the parts manufacturer is offset; when an urgently needed part is required to overcome production-line shortages; and when the part in question is exclusive to the distributor.

By far the largest proportion of parts used in the production of computer hardware in Canada, however, is imported directly by the manufacturers of finished products. Table 4.1 shows imports of parts amounted to $114.4 million in 1972, or over 96 per cent of the total parts market. The major proportion of parts imports is the result of transfers between affiliated international companies; and for those companies that are highly vertically integrated, such parts are neither for sale to other manufacturers, nor is there usually any intention of

obtaining them from other parts suppliers. A large proportion of the parts market, therefore, is virtually closed to independent outside suppliers. The parts incorporated into finished products that are subsequently exported are eligible for duty drawback, which implies that Canadian-produced parts must also be competitive in price with those produced elsewhere because they have no protection against foreign-produced parts.

THE PRODUCTION OF COMPUTING EQUIPMENT

On the basis of its survey of the industry, the Board has estimated the value of shipments(1) of computing equipment in Canada in 1972 at $206.4 million. Mainframes accounted for $12.5 million, or 6 per cent of the value; peripherals accounted for $157.2 million or 76 per cent; related telecommunications equipment accounted for $2.8 million, or under 2 per cent; and parts, components and subassemblies accounted for $33.9 million, or about 16 per cent of the total value of shipments in 1972 (see Table 4.1). It is evident from these figures that Canadian production was concentrated on peripheral equipment. Although peripherals have continued to be the major product group in production in Canada since that time, there have been a number of changes in the products manufactured and in the structure of the industry that have affected the composition of the industry's output. The changes in production since 1972 are discussed later in this chapter.

In terms of ownership, foreign-owned firms dominate the computer hardware manufacturing industry in Canada. The Board has estimated that, of the total value of shipments of computing equipment in 1972 of $206.4 million, Canadian-owned firms accounted for $15.5 million, or 7.5 per cent; and foreign-owned firms accounted for $190.9 million, or 92.5 per cent. The domination of the Canadian market for computing equipment by foreign-owned suppliers was noted previously. It appears that foreign-owned producers dominate production in Canada as well.

When ownership by product group is considered, the proportions of production varied considerably. Canadian-owned firms accounted for 16 per cent of the value of mainframe shipments, 7 per cent of the value of peripheral equipment shipments, and 84 per cent of related telecommunications equipment shipments. Even the higher proportions for mainframes and related telecommunications equipment, however, are somewhat misleading in that the former included special-purpose mainframes for use outside the primary market, and the value of the latter was small by comparison at $2.3 million. As far as the Board could ascertain, Canadian-owned firms accounted for only a relatively insignificant proportion of the value of shipments of parts, components and subassemblies.

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(1) The value of shipments is a useful indication of the value of production because it normally reflects full factory costs of production, plus a margin to cover certain post-factory costs and a return on investment. There are no published statistics pertaining to the production or value of shipments of computing equipment.

Most of the output of the industry is exported; only a small proportion is retained for the domestic market. According to information derived from the Board's survey of the industry, total exports amounted to 87 per cent of the value of shipments. This high exports-to-shipments ratio(1) reflects the degree to which the rationalization of production has taken place among many of the subsidiaries of the foreign-owned producers.

Until the late 1960s, the foreign-owned producers in Canada generally operated plants of the miniature replica type, whereby small quantities of a fairly extensive range of products were manufactured mostly for Canadian consumption. As the range of products became wider, such a strategy of production could be pursued only by incurring inefficiencies in production because of the limited size of the Canadian market. Most of the foreign-owned producers decided to rationalize their production facilities in Canada and elsewhere, concentrating on the manufacture of only two or three products or subassemblies in a single location so that they could supply the entire needs of very large international market areas, of which the Canadian market would obviously be only a small part. Under this strategy, longer production runs could be maintained and benefits derived from more efficient production. At the same time it was recognized by the manufacturers that, except in those few instances where production and market demand in Canada coincided, most Canadian market needs would have to be met through imports.

The firms which had rationalized their production by 1972 included Digital Equipment, Honeywell Information Systems, and IBM. Two other firms that had established manufacturing facilities in Canada at that time, commenced their operations on a rationalized basis; these were Control Data Corporation and Sperry Univac Computer Systems. The NCR Canada Ltd., in its brief to the Board, endorsed rationalized production and announced plans for the production of a certain type of banking terminal under this concept. Burroughs Business Machines Ltd. also planned to commence their manufacturing operations in 1975 on a rationalized basis. These firms represent the largest foreign-owned manufacturers in Canada, and indeed, the largest firms in the computer hardware industry. The fact that they have all adopted or endorsed a strategy of rationalized production suggests that it is a very significant factor in the economics of world-wide computer hardware production. Not all of the foreign-owned producers, however, have adopted this approach. Some of the smaller foreign-owned companies have chosen to assemble a wide variety of equipment in Canada.

Where Canadian-owned firms are concerned, the concept of rationalized production does not usually arise. The firms are generally too small to have production facilities both in Canada and in other countries. The largest Canadian-owned firm, Northern Telecom,

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(1) The exports-to-shipments ratio derived from Table 4.1 is 90 per cent. This even higher ratio results from using exports reported by Statistics Canada rather than those reported in the Tariff Board survey. Differences may be due to the valuation of shipments noted previously, and to non-reporting in the survey, but the Board is satisfied that the ratio is of a very high order. These are discussed in more detail in Chapter VI.

a producer of related telecommunications equipment and computers for telephone circuit-switching, has production facilities in the United States, but these are not involved with computing equipment. Even without affiliated production facilities abroad, Canadian-owned firms have achieved success in meeting competition in foreign markets by exporting a high proportion of their output of computing equipment - an estimated 58 per cent of their value of shipments in 1972. Although this is not as high as the estimated 89 per cent of the value of shipments exported by foreign-owned companies in 1972, it represents, nevertheless, a very important portion of their output. The export orientation of Canadian-owned firms, however, is uneven. Some companies, such as Consolidated Computer Inc., have exported virtually all of their production, while others have exported very little.

In much the same way as the rationalized production of the subsidiaries of the foreign-owned producers is concentrated on two or three products, so also is the production of Canadian-owned companies. Typically, Canadian-owned producers specialize in a narrow range of products, each manufacturing only one or two types of peripheral devices or related telecommunications equipment. They do not possess the resources and depth of the large multinational computer systems manufacturers, and for that reason are more vulnerable to advances in technology, and to shifts in user preferences which may leave their particular products obsolescent.

The methods of production employed by Canadian producers of computing equipment range from being highly automated to being similar to customized assembly. The highly automated plants are usually those of the large, foreign-owned companies where both highly sophisticated machines and assembly line operations are employed. In general, however, individual work stations in which several operations are performed are perhaps more common than assembly line operations. In many instances, process-control and other types of computers are used in various stages of the production of computing equipment. The methods also vary according to the type of equipment in production; it would appear that the production of mainframes involves a greater use of labour than do other types of equipment. Customized assembly, on the other hand, is more typical of the smaller Canadian- and foreign-owned firms. Individual work stations in which single units of equipment are assembled from start to finish are most common. Under this method, minor changes in the hardware to meet different customer requirements may be undertaken without great difficulty. Under all methods of production, producers appear to have committed relatively significant amounts of skilled labour to the testing and verification of finished products after final assembly.

From an over all viewpoint, the production of computing equipment in Canada by both large and small firms is more in the nature of assembly operations than manufacturing operations. However, in view of the wide-scale rationalization of production, this is probably the situation that now prevails wherever computing equipment is made.

The production of computing equipment in Canada is undertaken largely in the provinces of Ontario and Quebec. In Ontario, production is centred in the Toronto area, and to a lesser extent, in the Ottawa area. Certain producers are located in a number of other towns throughout Ontario, including Waterloo, Peterborough, Brockville, and Carleton Place. In Quebec, production is centred the Montreal area. Very little production is undertaken in other provinces. A small value of related telecommunications equipment is produced in Vancouver and some parts manufacturing has taken place in Halifax. The locations of production facilities in Canada appear, for the most part, to be in or near the major Canadian market area. In view of the rationalization of production, this is probably a historical relationship rather than a reflection of current needs.

The Producers of Computing Equipment

Since the Board's survey of the industry, which related to 1972, several changes have taken place that have affected the producers of computing equipment in Canada. New firms have entered the industry, other firms have ceased production in Canada, and yet others have changed the types of equipment being produced. In short, the dynamic nature of the industry is reflected both in technological advances in the products manufactured and in the relatively rapid changes among producers. This section first discusses the situation that prevailed in 1972 concerning producers and their products; attention is then directed to some of the more significant changes that have taken place since that time.

The Situation Existing in 1972

In 1972, there were 25 companies engaged in the production of finished computing equipment in Canada. Six firms were reported as being engaged in the manufacture or assembly of computer mainframes, thirteen produced peripheral equipment and six produced related telecommunications equipment. Some firms produced equipment in more than one product group. The names of these companies and the products they produced are listed in conjunction with the names of suppliers in Appendix C.

The names of 63 parts producers in Canada were brought to the attention of the Board. At the public sittings and through later contacts, however, it became apparent that the extent to which these producers provided parts to the finished computer product manufacturers could not be determined with any accuracy; indeed only one parts producer was able to estimate the value of its inputs to finished product manufacturers.(1) Consequently, the Board is aware only of the total value of parts produced by the finished product manufacturers in 1972. Three computing equipment manufacturers reported that they produced parts, components and subassemblies in 1972 for use by themselves or by their affiliated companies for incorporation into finished computer products.

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(1) Based on information provided by computer hardware manufacturers and certain parts suppliers and distributors, it appears that most of the independent parts producers' output in Canada is used by the home entertainment, communications and defence industries, together with a smaller portion diverted to other industrial, commercial and scientific uses.

Of the six mainframe producers in 1972, only Control Data Canada Ltd. was producing mainframes for general-purpose computer systems. It was beginning to bring into full production its medium-scaled processor in its Cyber 70 series. Three other companies, Digital Equipment of Canada Ltd., Datagen of Canada Ltd., and the Canadian General Electric Company Limited, were assembling one or more models of minicomputers, with the latter company's model specifically designed for the control of industrial processes. The computer mainframes produced by Northern Telecom and GTE Automatic Electric (Canada) Ltd. were designed for use exclusively as parts of integrated electronic telephone exchanges and, as such, were destined for very particular markets outside the mainstream of data processing.

The peripheral equipment produced in Canada in 1972 may be classified as either data communications terminals or data entry systems and devices and data preparation devices. Nine firms produced data communications terminals of various types including CRT displays, teletypewriters, CAL terminals, large screen displays and mark-sense terminals. Four other firms, including the largest Canadian- and foreign-owned producers, manufactured key-to-tape and key-to-disk entry systems and card data recorders and verifiers. The output of these four firms accounted for the bulk of the value of production of peripherals and of total computing equipment in 1972. In terms of both the volume and value of production in Canada, production was therefore concentrated upon stand-alone peripherals that could operate independently of any particular supplier's computer system.

The six producers of related telecommunications equipment in Canada in 1972 were all reported to be producers of modems of various speeds and capabilities. Two firms were also reported to be producers of multiplexers.

There were, in 1972, four producers of parts, components and subassemblies for use in finished computer products. Digital Equipment of Canada Ltd. produced back panels and other components for incorporation into minicomputer mainframes; IBM Canada Ltd. produced semiconductor devices and other parts for use in a range of equipment; Sperry Univac Computer Systems produced power supplies for most of the range of Univac computers; and Microsystems International Ltd. produced semi-conductor devices for use in computer memories.

In 1972, many of the firms that produced computing equipment in Canada also manufactured non-computer products. In certain instances, many of the resources and skills employed in the production and marketing of computing equipment were also utilized for these other products. The computing equipment produced by the Canadian General Electric Company Limited, Northern Telecom, and GTE Lenkurt Electric (Canada) Ltd., probably accounted for less than 3 per cent of their total output of all industrial and communications equipment. Similarly, the peripheral equipment produced by such firms as Ferranti-Packard Limited, Leigh Instruments Limited, Marsland Engineering Limited, and Westinghouse Canada Limited probably accounted for less than 15 per cent of the total output of each of these firms in 1972.

Recent Developments

Information on changes affecting the production of computing equipment in Canada since 1972 has been derived initially from published reports, which the Board has confirmed where possible with the companies concerned. The expansions in productive capacity, the entry of new producers and product additions are first noted, followed by reports of firms withdrawing from production; these are all noted within the context of product groups.

Mainframes - Control Data Canada Ltd., commenced the manufacture of large-scale general-purpose mainframes in its Cyber 172 and 173 series in 1974. The first shipments were made in 1975, and the scheduled production for 1976 was 24 machines. In late 1975, a new Canadian-owned company, Display and Decision Systems Ltd., developed and produced a microprocessor CPU consisting of 54 bipolar chips. Licensing agreements were reached for the CPU to be manufactured in France by Compagnie Honeywell-Bull. Honeywell Information Systems took over the computer business of the Canadian General Electric Company Limited, in March 1974. It announced in November 1975, that it would take over the servicing and other functions involved with the computer systems of Xerox of Canada Limited, by the end of 1976. Micro Computer Machines Ltd., a new Canadian-owned company, was incorporated in 1973 to produce small, battery-operated, self-contained minicomputer systems. The company produced 162 units in 1975, valued at about $1 million. In early 1976 the company expanded its production facilities to manufacture floppy disks, line printers and other products. Digital Equipment of Canada Ltd., continued its assembly of PDP11 minicomputers, and planned to expand its facilities in 1976 to accommodate final assembly and testing and special computer systems. Consolidated Computer Inc., developed its own central processor for use in its Key-Edit 50 Phase II data entry system in 1974, but used PDP11 mainframes provided by Digital Equipment for its Key-Edit model 1000. In early 1976, Consolidated Computer Inc. witnessed a major change in its financial and management structure, with Central Dynamics Ltd. of Montreal, and Fujitsu Ltd. of Japan, becoming financial partners. Interdata of Canada Ltd. commenced the assembly of minicomputer mainframes in April, 1974, at its Mississauga, Ontario plant. IBM Canada Ltd., commenced production in Toronto of two small computer systems for the Canadian and export markets: the System /3 Model 15 in 1974; and the System /32 in 1975.

Datagen of Canada Ltd., announced in February 1975 that it would no longer produce mainframes at its Hull, Quebec plant and would revert to being a supplier of equipment from its U.S. parent. It was stated that in terms of both overhead costs and work scheduling problems, it was no longer efficient to operate the Canadian facility.

Peripheral Equipment - Burroughs Business Machines Ltd. is expected to commence production of electronic disk cartridge drives at its new plant in Winnipeg about mid-1976. In 1975, Control Data Canada Ltd. produced data communications terminals for the Trans-Canada Telephone System, and a subsidiary of Control Data, Computing Devices of Canada Ltd., produced similar equipment for the Department of National Revenue. I.P. Sharp Associates, a Canadian-owned computer service company, developed and produced integrated systems of hardware and software in

1974. The hardware included CRT displays and communications controllers. Marsland Engineering Limited, of Waterloo, Ontario commenced production in 1975 of its advanced version Model 33 teletypewriter designed for use with computers. In 1974, IBM Canada Ltd. started producing Model 3741 and 3742 data entry stations, and a new medium-speed printer used in several IBM systems at its Toronto facilities.

In January 1975, Honeywell Information Systems closed its Bowmanville, Ontario plant due to a decline in demand for its key-to-tape data entry devices. It had previously also been producing banking terminals.

Related Telecommunications Equipment - Gandalf Data Communications Ltd., a Canadian-owned company in Ottawa, expanded its product range in 1974 and 1975 by producing LDS multi-drop network controllers and private network computer exchange systems (PACX).

In late 1972, the Canadian General Electric Company Limited discontinued the production of modems which had been manufactured in its Toronto plant.

Parts, Components and Subassemblies - Interdata of Canada Ltd. commenced the assembly of printed circuit boards at its Mississauga, Ontario plant in June 1974.

Two companies ceased production of semi-conductor devices in Canada in 1974 and 1975, some of which had been supplied to finished computer product manufacturers. Microsystems International Ltd., in Ottawa and Siltek Industries Ltd., in Bromont, Quebec both withdrew from business; intense competition was the primary cause cited. In 1975, IBM Canada Ltd. began phasing down its production of semiconductors and other components in its Bromont, Quebec plant, but nevertheless expanded its plant there in order to accommodate its typewriter assembly operations in Canada, which were to be transferred from Toronto over a four-year period. Digital Components Ltd., a Maritime producer of connectors used in computer hardware, withdrew from business in 1975. The closing of Honeywell Information Systems plant in Bowmanville also resulted in the withdrawal from production of certain subassemblies.

Miscellaneous Products - Since 1972, the production of several devices which employ computer logic has taken place. The closest relevant product group that would encompass these is peripheral equipment. They are included here because they represent a significant value in terms of total production. The NCR Canada Ltd., developed and produced an electronic encoding system for banking in Waterloo, Ontario in 1974. The total production reached about 10,000 units in 1974-75. Computer Performance Instrumentation Inc. developed and produced a hardware monitor system which uses a combination of hardware and software at its plant in Kitchener, Ontario in 1973. Marsland Engineering Limited manufactured mail sorting machines for the Canadian Post Office under licence from Nippon Electric Co. Ltd. Production commenced in late 1974, and 16 units were delivered in 1975. Westinghouse Canada Limited obtained a contract in 1974 for the supply and installation of a computerized control system for the Montreal Metro Subway. CAE Electronic Ltd. also obtained contracts for

computer-based data logging systems and for air traffic control systems in 1973. The processors for the latter contract were to be provided by Interdata of Canada Ltd.

The picture that emerges is one of a mixture of gains and losses in almost every product group, with no clear indication of over all expansion or contraction. On balance, it would appear that there has been a net increase in terms of mainframe production and a net decrease in terms of the production of parts, components and subassemblies. The production of peripherals may have been declining since 1972 and some gains may have been made in related telecommunications equipment.

EMPLOYMENT IN THE COMPUTER HARDWARE INDUSTRY

The Board estimates that the suppliers of computing equipment employed about 14,000 persons in Canada in 1972. This information was derived largely from the Board's survey of the industry and was supplemented by information from published sources. About 7,300 or 52 per cent were engaged in marketing; 3,100 or 22 per cent were engaged in production; 2,775 or 20 per cent were performing general administrative functions; and 825 or 6 per cent were engaged in research and development. These figures are shown in Table 4.10.

The large number of persons engaged in marketing versus those in other functions is indicative of the need of this industry for the supplier to interact directly with the user. The complex nature of the equipment requires that the supplier provide the user with a wide range of skills and services to be available both before and after the sale of equipment. The marketing function therefore includes such categories of personnel as salesmen, systems engineers, application analysts, service representatives and those involved in market research, advertising and sales administration. Furthermore, the relatively large number of people employed in marketing, as contrasted with the number of production workers, also reflects the fact that computer equipment is mainly produced elsewhere.

The suppliers of related telecommunications equipment had a smaller proportion of employees engaged in marketing than suppliers of other types of equipment. This reflects the role played by the telephone companies in marketing this equipment and is an indication that the identified suppliers have less direct contact with users than the suppliers of the other product groups. In addition, related telecommunications equipment in general may require more specialized and less diverse sales support personnel than other types of equipment.

Companies that supplied mostly mainframes and computer systems accounted for 86.4 per cent of total industry employment. This compares with 11.4 per cent for suppliers of peripherals and 2.2 per cent for suppliers of related telecommunications equipment. Moreover, there were less than 25 employees, in three out of every four firms, supplying mainly peripheral or related telecommunications equipment. In contrast, firms supplying mostly computer mainframes and systems were significantly larger employers, usually employing over 100 persons. The level of education of employees varied, particularly between companies which were mainly involved with assembly operations

and those which carried out development and manufacturing operations. The latter tended to have a higher proportion of university and technical school graduates than the former.(1)

Table 4.10: Estimated Employment in Canada by Suppliers of Computing Equipment, by Supplier Group, by Business Function, 1972

		Business Function			
Supplier Group	Total	Marketing	Production	Research & Development	Administrative & Other
			- Number -		
Computer mainframes and systems[a]	12,000	6,325	2,775	620	2,380
Peripheral equipment	1,600	850	250	175	325
Related telecommunications equipment	300	125	75	30	70
Total	14,000	7,300	3,100	825	2,775
	- Percentage for each business function -				
Computer mainframes and systems[a]	100.0	52.3	22.9	5.1	19.7
Peripheral equipment	100.0	53.2	15.6	10.9	20.3
Related telecommunications equipment	100.0	41.7	25.0	10.0	23.3
Total	100.0	52.1	22.1	5.9	19.8
	- Percentage for each market supply group -				
Computer mainframes and systems[a]	86.4	86.7	89.5	75.2	85.8
Peripheral equipment	11.4	11.6	8.1	21.2	11.7
Related telecommunications equipment	2.2	1.7	2.4	3.6	2.5
Total	100.0	100.0	100.0	100.0	100.0

(a) Employment data for the four firms supplying parts, components and subassemblies are included with those for computer system suppliers. Three of the four firms supplying parts, components and subassemblies also supplied computer systems and did not provide separate data for these operations.

Source: Tariff Board.

(1) A section of the Board's survey of the industry sought information on the level of education of employees in firms supplying computer and related telecommunications equipment. Usable data were obtained only from certain suppliers. The highest level of education obtained, based on the returns from computer mainframe suppliers, showed 25 per cent of their employees had at least one university degree, another 25 per cent had post-secondary training - community college, etc. - about 37 per cent had completed high school and the remaining 13 per cent had less than complete high school education.

The Board estimates that employment in 1972 by firms engaged in some aspect of production of computing equipment and parts totalled 11,400 persons. Of this number, 5,400 were engaged in marketing, 3,100 in production, 825 in research and development and 2,075 in administrative and other jobs. These figures are shown in Table 4.11. Firms that produced equipment in Canada employ a significantly larger number of persons on average than firms which are suppliers only. Although producers accounted for just 18.0 per cent of the total number of firms in the industry, they nevertheless accounted for 81.4 per cent of total employment.

Table 4.11: Estimated Employment in Canada by Producers and Suppliers of Computing Equipment, by Business Function, 1972

	No. of Firms	Total	Marketing	Production	Research & Development	Administrative & Other
			- Number of employees -			
Producers[a], suppliers	24	11,400	5,400	3,100	825	2,075
Suppliers only	109	2,600	1,900	-	-	700
Total	133	14,000	7,300	3,100	825	2,775
			- Percentage -			
Producers[a], suppliers	18.0	81.4	74.0	100.0	100.0	74.8
Suppliers only	82.0	18.6	26.0	-	-	25.2
Total	100.0	100.0	100.0	100.0	100.0	100.0

(a) Producers are also suppliers.

Source: Tariff Board.

The supply of computing equipment is characterized by a few large suppliers and a large number of small suppliers, the large firms accounting for most of the employment. This is indicated in Table 4.12. In 1972, out of the total of 14,000 persons employed by suppliers, six companies, each employing in excess of 500 persons, accounted for 75.6 per cent of total employment. The 12 largest firms accounted for 84.4 per cent of total employment. Of a total of 133 firms, 97 employed less than 25 persons. These 97 firms, or 72.9 per cent of the total number of firms, accounted for only 1,095 employees or just 7.8 per cent of total employment. The number of employees in this latter group involved in supplying computing equipment averaged 11 employees per firm. A number of small suppliers are part of much larger organizations when activities other than those involving computing equipment are included. About 25 of the smaller firms, those employing 25 persons or less, are in this category.

Table 4.12: Concentration of Employment by Suppliers of Computing Equipment in Canada and by Company Ownership, 1972

Number of Employees	Number of Suppliers	Total Employees	Percentage of Suppliers	Percentage of Employees
		- All companies -		
500 and over	6	10,580	4.5	75.6
100 - 499	6	1,240	4.5	8.8
50 - 99	6	455	4.5	3.3
25 - 49	18	630	13.5	4.5
Less than 25	97	1,095	72.9	7.8
Total	133	14,000	100.0	100.0
		- Canadian-owned -		
500 and over	1	500	1.8	37.3
100 - 499	-	-	-	-
50 - 99) 25 - 49)	7	265	12.5	19.8
Less than 25	48	575	85.7	42.9
Total	56	1,340	100.0	100.0
		- Foreign-owned -		
500 and over	5	10,080	6.5	79.6
100 - 499	6	1,240	7.8	9.8
50 - 99) 25 - 49)	17	820	22.1	6.5
Less than 25	9	520	63.6	4.1
Total	73	12,660	100.0	100.0

Source: Tariff Board.

Foreign-owned suppliers of computing equipment accounted for the bulk of total employment. Their employment amounted to 12,660 persons in 1972 or 90 per cent of the total compared with 1,340 for Canadian-owned suppliers or slightly less than 10 per cent of total employment. Foreign-owned suppliers, in terms of the number of employees, were considerably larger, on average, than that of Canadian-owned suppliers which employed an average of 24 persons compared with 164 for foreign-owned firms. However, the average number of employees of the latter firms was affected significantly by the operations of one very large company. This was also true where Canadian-owned suppliers were concerned; over one third of the total number of employees were employed by a single firm.

Firms which were both producing and supplying computing equipment in Canada, as opposed to those that were suppliers only, accounted for 81.4 per cent of all employees in the industry. Table 4.13 indicates that employment by producers is concentrated in a few firms. In 1972, six producers each employing 500 or more persons accounted for 92.8 per cent of the total of 11,400 persons employed by producer firms. Small producers, those employing less than 25 persons, accounted for less than 1 per cent of the total employment attributable to all producers.

Table 4.13: Concentration of Employment by Producers of Computing Equipment in Canada and by Company Ownership, 1972

Number of Employees	Number of Producers	Total Employees	Percentage of Producers	Percentage of Employees
		- All companies -		
500 and over	6	10,580	25.0	92.8
100 - 499) 50 - 99)	4	480	16.7	4.2
25 - 49	8	260	33.3	2.3
Less than 25	6	80	25.0	0.7
Total	24	11,400	100.0	100.0
		- Canadian-owned -		
500 and over	1	500	8.3	64.1
100 - 499)	-	-	-	-
50 - 99) 25 - 49) Less than 25)	11	280	91.7	35.9
Total	12	780	100.0	100.0
		- Foreign-owned -		
500 and over	5	10,080	41.7	94.9
100 - 499) 50 - 99)	4	480	33.3	4.5
25 - 49) Less than 25)	3	60	25.0	0.6
Total	12	10,620	100.0	100.0

Source: Tariff Board.

Some of the companies which seem relatively small, 49 employees and less, when only the production of computing equipment is considered, are in fact somewhat larger enterprises when their total activities are considered. Five of the eight companies shown in Table 4.13 with employment of 25 to 49 persons and three of the six with less than 25 employees would fall in that category.

Foreign-owned producers employed 10,620 persons or 93.2 per cent of the total employed by all producers while Canadian-owned producers employed 780 persons or 6.8 per cent. Five foreign-owned producers, each of which employed 500 or more persons, accounted for 94.9 per cent of all employment in production by foreign-owned companies. As far as Canadian-owned companies are concerned, one company accounted for 64.1 per cent of total employment by such companies producing computing equipment in Canada in 1972.

The distribution of employment in Canada has implications for tariff policy. Marketing employment related to Canadian production by all firms is small because most of the production is exported. Therefore, most marketing employment is related to the selling and servicing of imported equipment. Such employment would not be affected by any

moderate tariff rate changes - either an increase or a decrease. Moreover, the marketing employment would still be necessary whether all requirements were produced in Canada or imported.

Nor is the employment in the research and development function necessarily related directly to the products produced by the firm in its Canadian production facilities. Where large, foreign-owned companies are concerned the research and development function may be part of a broader mandate than simply the scope of the products manufactured in Canada. In many instances, there is also a large software involvement in research and development. In the smaller companies, including the Canadian-owned companies, research and development is directed heavily towards upgrading products actually in production. The effect of changes in tariff rates on research and development activities is therefore complex and difficult to predict.

A sizable proportion of administrative employment is market-oriented and therefore open to the same conclusions as marketing employment itself. In the absence of any production of computing equipment in Canada, about two thirds of total employment in the industry would still be required.

Employment involved in the application of computers by users is many times greater than the marketing and related administrative employment of the suppliers and is equally unaffected by whether or not there is production in Canada. Production employees and production related workers in administration are a relatively small proportion of the total employment involved.

RESEARCH AND DEVELOPMENT ACTIVITIES

Information on research and development (R & D) activities in Canada by producers of computing equipment was obtained from the Board's survey of industry, and relates to the years 1970, 1971, and 1972. The Board attempted to reconcile the reported activities and expenditures with the support provided by government for R & D, which is described in Chapter V. In terms of total R & D expenditures, the Board considers the estimates of government support to be a more reliable guide,(1) and these have been used in conjunction with the estimates reported by industry.

The computing equipment products on which R & D was being undertaken in Canada in 1972, are shown in Table 4.14, together with the names and locations of the firms involved. The table indicates that 20 companies were engaged in the development of a variety of computer mainframes, peripherals, related telecommunications equipment, and parts, components and subassemblies. Four firms were carrying out R & D activities relating to computer mainframes, only one of which, Control Data Canada Ltd., was involved with general-purpose computers.

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(1) Government support programs for R & D covered several additional companies and projects that were not reported to the Board. This is due mainly to unsurveyed or non-reporting companies, plus differences between the reporting of the disbursement and receipt of funding. Government programs generally require a matching of government funds by the companies involved; thus, expenditure tables have been derived on the assumption that industry expenditures have matched those of government. This has been noted where appropriate.

Ten companies were developing peripheral products, primarily a limited range of data preparation devices and terminals. Six companies were engaged in R & D on modems. One company was engaged in R & D on power supplies, and one company was similarly engaged on semi-conductor devices. Two companies were conducting R & D in more than one product group.

Table 4.14: Research and Development Activity by Producers of Computing Equipment in Canada, 1972

Name of Company	Research and Development Activity	Location of R & D Facilities
Mainframes		
Canadian General Electric Company Limited	Process control computers	Peterborough, Ont.
Control Data Canada Ltd.	General-purpose computers	Streetsville, Ont.
GTE Automatic Electric (Canada) Ltd.	Special-purpose computers for use in telephone switching systems	Brockville, Ont.
*Northern Telecom	Special-purpose computers for use in telephone switching systems	Ottawa, Ont.
Peripherals		
*Comterm Limited	Remote batch terminals	Pointe Claire, Que.
*Consolidated Computer Inc.	Key/disk, key/drum data entry systems	Ottawa, Ont.
Ferranti-Packard Limited	Alpha-numeric display systems and optical character recognition devices	Toronto, Ont.
IBM Canada Ltd.	Data entry devices	Don Mills, Ont.
*Leigh Instruments Limited	Alphagraphic printer/plotter	Ottawa, Ont.
*Lektromedia	CRT terminals	Pointe Claire, Que.
*Marsland Engineering Limited	Teletypewriters	Waterloo, Ont.
*Pylon Electronic Development Company Ltd.	Optical character recognition devices	Lachine, Que.
*T-Scan Limited	OCR terminal	Scarborough, Ont.
Westinghouse Canada Limited	CRT terminals	Hamilton, Ont.

Table 4.14 (concl.)

Name of Company	Research and Development Activity	Location of R & D Facilities
Related Telecommunications Equipment		
Canadian General Electric Company Limited	Modems	Peterborough, Ont.
*Edmunde Newhall Associates Ltd.	Modems	Rexdale, Ont.
*ESE Limited	Modems	Rexdale, Ont.
*Gandalf Data Communications Ltd.	Modems	Ottawa, Ont.
GTE Lenkurt Electric (Canada) Ltd.	Modems	Burnaby, B.C.
Northern Telecom	Modems	London, Ont.
Parts, Components and Subassemblies		
Sperry Univac Computer Systems	Power supplies	Dorval, Que.
Microsystems International Ltd.	Semi-conductors	Ottawa, Ont.

(*) Canadian-owned companies.

Source: Tariff Board.

In addition to the companies listed in Table 4.14, several others were also engaged in pure research activities relating indirectly to computer hardware, according to information derived from government support programs. These ranged from research into the properties of thick film multilayer circuit boards, to investigations of on-line sensor systems. These types of pure research may or may not result in new products being developed, and any new products thus derived may not necessarily have application to computer hardware.

Table 4.15 indicates the estimated expenditures on R & D by the producers of computer hardware in Canada in 1970, 1971, and 1972. Companies not encompassed by the Tariff Board survey, together with companies not reporting R & D activities are believed to account for a sizable proportion of total R & D expenditures. When these have been calculated, on the basis of probable expenditures required in order to match government funding, the estimated total R & D expenditures were about $18.9 million in 1970, about $27.7 million in 1971, and about $25.9 million in 1972. The R & D expenditures for 1972 represented approximately 4.3 per cent of estimated total market revenues of $598 million at the retail level in 1972.

Some information was provided by companies concerning the source and application of R & D funding. For those companies reporting in 1972, 23 per cent of the funding was generated internally, 39 per cent was provided by parent companies, and 38 per cent was provided by the federal government. For Canadian-owned companies, 54 per cent came from internal company sources, and 46 per cent from the federal government. Where foreign-owned companies were concerned, 18 per cent was from internal sources, 46 per cent from parent companies, and 36 per cent from the federal government. In terms of the application of R & D funding, 88 per cent was employed for current expenditures, and 12 per cent was spent on plant and equipment. Canadian-owned companies accounted for 15 per cent of reported R & D expenditures, compared with 85 per cent for foreign-owned producers. It was not possible to determine R & D expenditures by product group.

Table 4.15: Estimated Expenditures on Research and Development by Producers of Computing Equipment in Canada, 1970 to 1972

	1970	1971	1972
		- $'000 -	
Funds provided by government	7,641.3	12,364.9	10,725.4
Funds provided by companies	5,025.0	9,625.0	11,375.0
Sub-total	12,666.3	21,989.9	22,100.4
Estimated matching share required from companies[(a)]	6,216.3	5,689.9	3,750.4
Total R & D expenditures	18,882.6	27,679.8	25,850.8

(a) Some of the funding provided by government was under-reported or unreported by receiving companies. As government R & D support generally requires to be at least matched by industry, the pertinent figures represent total funds provided by government, less the amounts reported as received from government.

Source: Tariff Board Survey; various federal government departments and their publications.

Slightly in excess of 800 persons were estimated to be employed in R & D activities in 1972 by the computer hardware producers. Of this total, some 73 per cent were employed by foreign-owned companies, and over 200, or some 27 per cent by Canadian-owned companies. This latter proportion appears to be high when contrasted with the estimated 15 per cent of reported R & D expenditures incurred by Canadian-owned companies. It may be the result of difficulties in classifying personnel under research and development activities. In both Canadian and foreign-owned companies, however, it is known that many R & D employees were involved with software development.

On the basis of the available evidence, it is difficult to place Canadian research and development activities within a wider context. On the one hand, there appears to have been some R & D efforts directed towards peculiarly Canadian problems, such as the development of terminals to suit the Canadian banking industry, but these may have been more by way of adaptation than any concerted effort based upon initial conceptualization in Canada. On the other hand, some R & D expenditures, particularly on the part of the smaller companies, appear to have been directed at developing a hardware device that an inventor/entrepreneur had devised. Whether research and development expenditures take place as a result of perceived market demand, or whether they are more in the nature of proving and extending the capabilities of a specific unit of hardware that promises to be electronically or mechanically sound, cannot be determined. It is probable that both types occur. As far as total R & D expenditures are concerned, a few published reports have suggested that the large U.S.-based computer systems manufacturers expend in the order of 5 to 10 per cent of their revenues on R & D. This magnitude would seem to imply that the estimated 4.3 per cent of total market revenues in 1972 that was spent in Canada on research and development may be less than the proportion expended on this function elsewhere. On the other hand, the R & D employment in this industry, at 6 per cent of the total employment in the industry in 1972, compared well with 4.2 per cent R & D employment in the electrical products industry, 5.6 per cent in the aircraft and parts industry, and 1.1 per cent for all manufacturing industries in 1972.

SUMMARY AND CONCLUSIONS

The production of computers emerged as a significant economic activity less than 30 years ago. During the short time-span it has developed into a major world industry. Three interrelated factors have been significant in this new development: rapid technological advances; new software and new applications; and competition and specialization among manufacturers.

In 1972, the market for computers, peripherals, related telecommunications equipment, parts, components and subassemblies in Canada was estimated at $358.1 million at the manufacturer's level. The value of shipments was estimated at $206.4 million, imports at $337.6 million, and exports at $186.0 million. The bulk of domestic production is exported and most of the domestic requirements are imported.

The cumulative total number of computer systems in place in Canada at the end of May 1973, totalled 5,736. Their value was estimated at $1,530 million. In terms of the cumulative value of computer installations in 1973, Canada ranked seventh in the world.

In recent years in Canada there has been a relatively more rapid increase in the number of computer systems than in their value. This reflects the fact that, because of technological advances, small, powerful, relatively low-cost computers have accounted for an increasing share of the market. Between 1968 and 1973, 70 per cent of new computer installations had a monthly rental value of less than $2,000.

About 200 companies in Canada in 1972 were supplying one or more of computer mainframes, peripherals, related telecommunications equipment, parts, components and subassemblies. The major suppliers, however, were wholly-owned subsidiaries of foreign companies located primarily in the United States. IBM was the dominant supplier and together with three other subsidiaries of United States manufacturers: Honeywell, Univac and Burroughs, accounted for 81.4 per cent of the cumulative value of total installations.

In 1972, there were 24 companies in Canada engaged in some aspect of the production of computing equipment, or parts and subassemblies. Of the total value of shipments in 1972, the major portion, at $157.2 million consisted of peripherals, mostly terminals and data entry devices. Parts, components and subassemblies accounted for $33.9 million, mainframes for $12.5 million and related telecommunications equipment for $2.8 million.

Foreign-owned firms dominated the production of computing equipment in 1972. Although they represented only half the number of producers, they accounted for 92.5 per cent of the value of shipments, compared with just 7.5 per cent for Canadian-owned firms. About 90 per cent of the output of foreign-owned producers was exported, mainly to the United States. Canadian-owned firms exported a smaller, though still major proportion of their output, about 58 per cent in 1972. The fact that producers of computers and related equipment export most of their output means that tariff protection is of small consequence for 85 to 90 per cent of the output. The tariff is thus of limited impact as far as production in Canada is concerned. Furthermore, the rate of duty on parts and components offers little protection to the Canadian producers of parts and components, because the drawback provisions lead to a refund of the duty paid on parts and components incorporated into finished products which are subsequently exported. The rate of duty has an impact on only the small portion of output that remains in Canada.

A very large proportion of the value of output was concentrated in a few firms. The four largest producers accounted for about 83 per cent of total output. The high degree of concentration of production indicates that many producers were relatively small. One factor that contributes to the survival of such companies is the specialization in the production and marketing of one or two products which frequently do not compete with the offerings of larger manufacturers.

Total employment by all suppliers in 1972 was estimated at 14,000 persons, one half of which were engaged in marketing, about one fifth, in each, of production and administration and about 6 per cent in research and development. The high proportion of employees in marketing is a characteristic of the industry, but it may be accentuated in Canada because most suppliers are not producers, and are primarily concerned with the marketing of imported equipment. Marketing employment related to Canadian-produced computing equipment is small because most of the production is exported. Most marketing employment is related to the selling and servicing of imported equipment and a proportion of administrative employment is also market-oriented. Changes in tariffs would, therefore, appear to affect only the small proportion of employment related to the production of goods for the Canadian market; this would encompass a small proportion of employees in production, in research and development, and in administration.

CHAPTER V: THE ORGANIZATION OF THE INDUSTRY

CHAPTER V: THE ORGANIZATION OF THE INDUSTRY

This chapter continues the examination of the industry, but with greater emphasis upon its organization, and with particular reference to its international character. It provides a global setting in which to place the Canadian computing equipment industry, thus permitting an assessment of the influence of global considerations on the development of the international industry and its Canadian component.

To describe adequately the structure of an industry as complex, as large, and as widespread as the international computer industry, much more space would be required than that given to this subject in this report. Moreover, a full treatment would also require an intimate knowledge of the international operations of the major firms in the computer hardware industry and of the facts and figures explaining the strategic considerations underlying these operations. Very few persons, even within the industry, possess this kind of knowledge and almost all companies are extremely reluctant to divulge information of this nature. Consequently, the present chapter is largely derived from the Board's discussions with manufacturers and suppliers, and from the very few published sources that deal with this subject.

THE INTERNATIONAL MARKET FOR COMPUTING EQUIPMENT

In Chapter IV it was noted that the bulk of the Canadian computing equipment market was supplied by eight major computer companies, IBM, Honeywell, Univac, Burroughs, Control Data, NCR, Digital Equipment, and Xerox.(1) These eight companies are referred to in this chapter as multinational enterprises (MNEs). All of these companies manufacture and market systems of equipment including mainframes, peripherals, and in certain instances, related telecommunications equipment. Their ownership rests largely in the United States, but they are regarded as MNEs because they all engage to a greater or lesser extent in the manufacture, sale and service of their products in other countries. Their market domination extends to the rest of the world with the exception of the communist block nations. Only in Japan, the United Kingdom, West Germany, France, and possibly one or two other European countries, are there any domestically owned computer manufacturing companies with a significant, though often tenuous, market presence.

The success of these U.S.-based MNEs is due largely to two factors: first, most of the research and development in computers originated in the United States, which remains in the forefront of computer technology; secondly, the size, strength and receptiveness of the U.S. market has given these companies a large domestic base from which they can penetrate and foster foreign markets. Thus, throughout most of the world, it is the computing equipment designed and produced by the MNEs that predominates.

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(1) Xerox Corporation has announced its intention of withdrawing from the computer market in 1976.

Market Shares and Concentration

The position of the MNEs in the international computer hardware market is measured here both by their share of the total value of computer installations and their share of total revenues derived from the sale or rental of all computer products. While each of these measures has its limitations, they provide a reasonably accurate basis for calculating market shares for an industry that lacks reliable published data.

Table 5.1: Estimated Share of the Value of Installed Computer Systems in Canada, the United States, and the World, by Major Computer Companies, 1973

Company	Canada May 1973	U.S. Dec. 1973	World Dec. 1973
	%	%	%
IBM	57.4	63.4[(a)]	61.0
Honeywell	9.6	9.6	)
Univac	9.5	7.4	)
Burroughs	5.0	4.7	)
Control Data	3.9	4.0	) 29.0
NCR	2.2	2.5	)
Digital Equipment	3.9	2.3	)
Xerox	1.6	1.8	)
Others (mainly U.S.)	6.9	4.3	)
European mfrs.	*	*	5.0
Japanese mfrs.	*	*	5.0
Total	100.0	100.0	100.0
Total Value ($ billion)	1.53	29.94	55.95
% of World Total Value	2.73	53.51	100.00

(a) Includes plug-compatible peripherals on IBM systems provided by other companies (4.6%).

Source: Canada - Canadian Information Processing Society, Annual Computer Census, Toronto, 1973, p. 15; United States and World - EDP Industry Report, International Data Corporation, Newtonville, Mass., August 2, 1974, pp. 6-7.

Table 5.1 demonstrates that the eight largest companies accounted for more than 90 per cent of the total value of all systems installed in 1973 in both Canada and the United States and, in the same year, in excess of 80 per cent of the value of world-wide installations. These figures are indicative of a very high level of market concentration and of the unique position of IBM in the world market. The fact that some peripherals and related telecommunications equipment are excluded from the value of computer system installations means that the share of the mainframe producers is somewhat overstated, but it is believed that this does not affect the relative

ranking. As might be expected the share of the mainframe companies of total gross revenues, in contrast to their share of the value of computer system installations, is smaller because gross revenues include all peripherals and related telecommunications equipment. This is confirmed by the figures shown in Table 5.2.

Table 5.2: Estimated World-Wide Revenues from Computing Equipment of U.S.-Based Computing Equipment Companies and Percentage Distribution, 1972 and 1973

Company	1972 Estimated Gross Revenues	1972 Per Cent of Total Revenue	1973 Estimated Gross Revenues	1973 Per Cent of Total Revenue
	$'million	%	$'million	%
IBM	7,533.4	50.5	8,794.4	49.0
Univac	1,069.9	7.2	1,100.0	6.1
Honeywell	1,062.5	7.1	1,195.5	6.7
Burroughs	684.5	4.6	847.4	4.7
Control Data	664.0	4.5	948.0	5.3
Litton Industries	496.0	3.3	524.8	2.9
NCR	467.4	3.1	726.4	4.0
Singer	288.6	1.9	328.6	1.8
Sub-total (8 companies)	12,266.3	82.3	14,465.1	80.5
Next 12 companies	1,038.6	7.0	1,389.0	7.7
Sub-total (20 companies)	13,304.9	89.3	15,854.2	88.2
Others	1,600.4	10.7	2,113.0	11.8
Total	14,905.3	100.0	17,967.2	100.0
	276 companies		275 companies	

Note: Several U.S.-based hardware companies have been omitted from this table in both 1972 and 1973 because estimates were not available for either total gross revenues, or the percentages of gross revenues relating to EDP products, or both. In 1972, there were 339 relevant companies, of which 63 fell into this category. In 1973, the figures were 370 and 95, respectively. However, most of the companies in question are either small or are intermediate-product suppliers; the most significant omission being the Xerox Corporation. Moreover, because many of the companies have extensive interests in non-computer products, and many of them do not publish revenues by product-line, there are difficulties in segregating pertinent revenues from other income. Consequently, the gross revenue totals are probably understated to some extent, but it is believed that these problems are unlikely to distort the overall situation appreciably or the inferences drawn therefrom.

Source: Adapted by the Tariff Board from estimates in Datapro 70, Datapro Research Corporation, Delran, N.J., June 1973, July 1974.

It is apparent that the rankings on the basis of gross revenues differ from those based on the value of computer system installations. Two of the eight major mainframe companies listed in Table 5.1 do not appear among the first eight companies in Table 5.2. Digital Equipment Corporation and Xerox Corporation have been replaced by Litton Industries, a manufacturer of small accounting computers, point-of-sale systems, OCR devices, printers and other peripherals, and by the Singer Company(1), a manufacturer of small computer systems, point-of-sale systems, and data entry equipment. Furthermore, changes in ranking also occur on a year-to-year basis, particularly between companies with 4 per cent or less of the market. Despite these fluctuations, it is evident that the eight largest companies account for more than 80 per cent of world sales of all U.S.-based computing equipment companies, and the top 20 firms for more than 90 per cent. The shares of the U.S.-based computer hardware companies would be slightly less than indicated, both individually and collectively, if the data in Table 5.2 included European and Japanese companies.

On a year-to-year basis, the revenues of the smaller companies in the industry appear to be increasing more rapidly than the revenues of the major mainframe companies. This may be a reflection of the greater exploitation by smaller companies of new products, and new application areas. It can be argued that these smaller producers will make some further relative gains but that the MNEs will in all probability remain the dominant market force.

IBM accounts for some 60 per cent of the value of computer installations (see Table 5.1) and for almost 50 per cent of the revenues accruing to U.S.-based computer hardware companies, making it the major force in the industry, unmatched by any other company. The estimated gross revenues of IBM from computing equipment in 1973 were about eight times larger than either of its nearest competitors, Honeywell and Univac. Whereas IBM derived an estimated 80 per cent of its revenues(2) from this source, with the remainder obtained from the sale and rental of office products such as typewriters, revenues from the sale and rental of computing equipment accounted for an estimated 50 and 42 per cent of the total sales of Honeywell and Univac, respectively.(3)

IBM at the end of 1973 was reported(4) as being the tenth largest industrial company in the world in terms of sales, the sixth largest in terms of assets, the fourth largest in terms of net income, and eighth largest in terms of employees, 274 thousand. It is, therefore, one of the largest and most profitable organizations in existence, in addition to being the major force in the computer industry. In 1969, however, a suit was filed by the United States Government charging IBM with violation of the Sherman Antitrust Act. The trial commenced in 1975; the outcome is not expected for some time.

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(1) The Singer Company announced its withdrawal from the computing equipment market in 1975.
(2) Datapro 70, Datapro Research Corporation, Delran, N.J., July 1974, p. 167.
(3) ibid., pp. 160, 205.
(4) Fortune, Time, Inc., Chicago, Illinois, August 1974, p. 185.

Classified by size of company, the high degree of concentration is readily apparent, as shown in Table 5.3. Only three firms had revenues from the sale of computing equipment in excess of $1 billion in 1973. Yet these firms, IBM, Univac, and Honeywell, accounted for 61.7 per cent of total gross revenues of all 275 U.S.-based computing equipment companies. Seventy-three firms, about one quarter of the total, with sales of $10 million or more, covered 96.8 per cent of all revenues. At the other end of the scale, 202 companies - nearly three quarters of all U.S. computing equipment suppliers - represented 3.2 per cent of total revenues. Individually, their market position is very small, even though their combined sales amounted in 1973 to $584 million. Canadian suppliers, including foreign-owned subsidiaries, are smaller but show a similar size structure. Only one company, IBM Canada Ltd., had gross revenues of more than $100 million, and only six companies had gross revenues of more than $10 million. Thirty-seven Canadian suppliers, 84 per cent of all suppliers, had sales of less than $10 million each. For reasons of confidentiality, it is not possible to indicate the distribution of total revenues for Canadian suppliers.

Table 5.3: The Number of Computer Hardware Suppliers by Range of Estimated Gross Revenues Derived from the Sale or Rental of Computing Equipment, 1972-73

	U.S.-Based Suppliers, 1973(a)			Can.-Based Suppliers, 1972-73	
Gross Revenue Range	No.	% of Total No.	% of Total Revenue	No.	% of Total No.
Over $1 billion	3	1.1	61.7	-	-
$100 million - $ 1 billion	10	3.6	23.6	1	2.3
$ 10 million - $100 million	60	21.8	11.5	6	13.6
Under $10 million	202	73.5	3.2	37	84.1
Total Companies	275	100.0	100.0	44	100.0
Total U.S. Revenue		$17.967 billion			

Note: Canadian-based companies include the subsidiaries of U.S.-based companies appearing in the first column. Although 196 Canadian-based suppliers are listed in Appendix C the majority are Canadian agents for small U.S. suppliers, and they account for very small, but unrevealed revenues.

(a) Table 5.2.

Market Specialization

The international market for computing equipment, which the industry supplies, is far from being homogeneous. There are slight differences between certain national or continental markets brought about by such factors as differences in telecommunications and electrical power standard; but these are not generally regarded as being too significant. Of much greater significance are the many types of users of computing equipment and the variety of requirements. These diverse needs, have called for a multiplicity of data processing products, 350 or more, as mentioned in Chapter II. Such a product range is beyond the capacity of any one company, with the possible exception of IBM, to meet in its entirety. Consequently, the market for computing equipment is segmented in submarkets in accordance with particular user needs, and hardware companies have responded by concentrating on one or more of these submarkets.

The market for computer systems can be divided by type and by size. There are four types: general-purpose, minicomputers and microprocessors, small accounting, and analog and hybrid. Demarcation lines between these types are, however, blurred. A general-purpose system, and some minicomputer systems, for example, can accomplish the tasks usually undertaken by small accounting computer systems. Moreover, although the term "general-purpose" seems to indicate an all-embracing solution to any data processing problem, the existence of other types of specialized systems and devices emphasizes the uniqueness involved in many data processing applications.

The size of a computer is generally measured in terms of the amount of main memory within the central processing unit, and the number of characters or words of data that it can hold at any one time. The capacity and performance of the mainframe can be extended by the addition of auxiliary memories, and processor enhancements. The capacities range from one or two thousand characters in small microprocessors, to many millions of characters in large general-purpose systems. Apart from memory enhancements, a computer system invariably includes various peripheral devices that perform input, output and storage functions. The number and capacity of these devices play an important part in determining the overall capacity and performance of a system. In general, the size of a computer system may be roughly equated with price, permitting the establishment of price categories, at least for general-purpose types of systems, which in turn provides the basis for indicating the areas of interest and specialization of computer systems suppliers.

The main U.S.-based computer companies which provide general-purpose computer systems are shown in Table 5.4. The sizes of the systems have been categorized as small, medium and large.

Table 5.4: Estimated World-Wide General-Purpose Computer Installations, U.S.-Based Companies, by Size, as of January 1, 1974

Company	Total No. of Systems	Small Less than $200,000 No.	% of Co.	% of Size	Medium $200,000-$800,000 No.	% of Co.	% of Size	Large More than $800,000 No.	% of Co.	% of Size
IBM	67,372	42,744	63.4	67.1	13,998	20.8	49.8	10,630	15.8	71.2
Honeywell	13,974	7,490	53.6	11.8	5,063	36.2	18.0	1,421	10.2	9.5
Univac	9,813	5,310	54.1	8.3	3,224	32.9	11.5	1,279	13.0	8.6
NCR	7,733	5,965	77.1	9.4	1,726	22.3	6.1	42	0.5	0.3
Burroughs	4,377	651	14.9	1.0	3,242	74.1	11.5	484	11.1	3.2
Singer	1,510	1,510	100.0	2.4	-	-	-	-	-	-
Control Data	931	-	-	-	227	24.4	0.8	704	75.6	4.7
Xerox	716	65	9.1	0.1	360	50.3	1.3	291	40.6	1.9
Digital	311	-	-	-	266	85.5	0.9	45	14.5	0.3
Others	50	-	-	-	23	46.0	0.1	27	54.0	0.2
Total	106,787	63,735	59.7	100.0	28,129	26.3	100.0	14,923	14.0	100.0

Note: The equivalent average monthly rental rates by system size are: small, less than $4,000; medium, $4,000-$16,500; large, more than $16,500.

Source: Adapted by the Tariff Board from estimates in EDP Industry Report, International Data Corporation, Newtonville, Mass., April 19, 1974, pp. 14-15.

There are only nine U.S.-based hardware companies that market general-purpose systems. From the viewpoint of market specialization, their position varies considerably in each size group. Only four companies, IBM, Honeywell, Univac, and NCR, have about 8 per cent or more of the installations of small general-purpose systems. In the medium-sized category, IBM, Honeywell, Univac, and Burroughs meet the same criterion, while of all installations of large general-purpose systems only IBM, Honeywell, and Univac have at least 8 per cent. IBM, Honeywell, Univac, and Burroughs are the only companies that offer a full range of general-purpose computer systems, in the sense that each size of system accounts for at least 10 per cent of each company's total installations. IBM, it should be noted, is dominant in all categories. All other companies appear to have concentrated on one or two sizes of systems; two, in fact, produced two sizes only, and one, Singer, produced only small systems.

There are many more U.S.-based manufacturers of special-purpose computers than of general-purpose systems, 67 as against 9.

Table 5.5: Estimated World-Wide Number and Value of Special-Purpose Computer Installations of U.S.-Based Companies, by Major Company, as of January 1, 1974

Company	Total No. of Systems	% of Total	Apparent Average Value	Estimated Total Value	% of Total Value
		%	$	$'000	%
Digital	32,959	32.4	23,000	758,136	20.8
Data General	9,270	9.1	10,400	96,375	2.6
Hewlett-Packard	8,505	8.4	32,650	277,655	7.6
Honeywell	5,265	5.2	68,950	362,957	10.0
Comp. Automation	4,300	4.2	9,700	41,740	1.1
Gen. Automation	4,245	4.2	23,050	97,850	2.7
Microdata	4,015	3.9	11,300	45,310	1.2
Varian Assoc.	3,984	3.9	21,350	84,990	2.3
IBM	3,495	3.4	109,750	383,625	10.5
Control Data	2,788	2.7	101,700	283,485	7.8
Interdata	2,038	2.0	35,000	71,370	2.0
Texas Instruments	1,390	1.4	34,150	47,460	1.3
Xerox	1,149	1.1	147,900	169,930	4.7
Systems Eng. Labs.	934	0.9	105,500	98,550	2.7
Raytheon	931	0.9	30,750	28,616	0.8
Others (52)	16,504	16.2	48,500	800,568	21.9
Total	101,772	100.0	35,850	3,648,617	100.0

Source: Adapted by the Tariff Board from estimates in EDP Industry Report, International Data Corporation, Newtonville, Mass., May 30, 1974, pp. 5-7.

The special-purpose computer systems covered by the statistics in Table 5.5 are mainly minicomputer systems, though, for certain companies, they may include as well some microprocessors and analog and hybrid systems. As shown, at the beginning of 1974, 15 companies accounted for 84 per cent of the number and 78 per cent of the value of all special-purpose computer systems installations of U.S. companies. This level of concentration is considerably less than for general-purpose systems. One company, Digital Equipment, accounted for 32 per cent of the number and 21 per cent of the value of all special-purpose systems, which is twice the share of any other company. Most manufacturers of special-purpose systems produce only this type of equipment. Five companies, Digital Equipment, IBM, Honeywell, Control Data, and Xerox, also supply general-purpose systems; these five accounted for 54 per cent of the total value of special-purpose computer installations.

It is significant that four of the five companies which also supply general-purpose systems produce special-purpose systems with a value well above the average. This suggests that they have more peripheral equipment associated with their installations, or that their special-purpose processors are generally larger and more powerful than the average special-purpose computer installation. The figures in Table 5.5 suggest that the influence of the nine U.S.-based MNEs extends

into the special-purpose systems market. Although not as preponderant as in general-purpose systems, they, nevertheless, represent a significant market force.

With respect to small accounting computer systems, market information is virtually non-existent. The main companies which supply these systems are Burroughs, NCR, Singer, Litton, IBM, Honeywell, Olivetti, Philips, and Nixdorf. The first two companies, which are general-purpose computer system suppliers, are believed to hold the largest market shares. The last four companies are marketing equipment manufactured in Europe, and European companies are believed to have made their greatest impact in this market segment.

Where analog and hybrid computer systems are concerned, market information is also unavailable. The digital processor elements in hybrid systems are undoubtedly included under special-purpose computer systems in Table 5.5 and most of the companies listed thereunder could supply these elements. Analog computers constitute a relatively insignificant product in terms of the total data processing equipment market.

There are no data concerning the world market for peripheral equipment, or for sales of such equipment by U.S.-based computing equipment companies. It is believed that about 60 per cent of the total value of a computer system installation is peripheral equipment. On the basis of gross revenues by U.S.-based companies for all computing equipment of $18 billion in 1973, Table 5.2, the revenues from peripheral equipment would be some $11 billion. It is estimated that the U.S.-based MNEs account for some 70 per cent of the gross revenues attributable to peripheral equipment in 1973. This is considerably below their 80 per cent share of total hardware revenues, but it suggests that they are also the largest peripheral equipment suppliers.

Standard peripheral equipment, devices which are common to most data processing needs, such as card reader/punch units, tape and disk drives, printers and terminals, are largely supplied by the computer system companies to complement their computer mainframes. Independent peripheral manufacturers also supply standard peripheral equipment, but have a stronger market position in special peripheral devices such as flat-bed plotters, computer output microfilmers and graphics terminals. Because the market for special-purpose peripherals is much smaller than for standard peripherals, most of the computer systems suppliers do not include these devices in their product lines unless they coincide with a particular market interest or strategy. To some extent, therefore, this market segment has been created and exploited more by specialist independent suppliers, which are usually companies other than those independents supplying standard peripherals. Stand-alone peripheral equipment, such as data entry, data preparation and data handling devices, is furnished by mainframe manufacturers and also by independent companies. Production of stand-alone peripherals by independents is usually specialized.

Related telecommunications equipment is believed to account for a relatively minor portion of the U.S.-based computer hardware companies' revenues in 1973, probably in the order of $400 to $500 million, or 2 or 3 per cent of the total. The market for this equipment

was initially supplied by the telephone and telegraph companies, which marketed equipment produced by their manufacturing subsidiaries, or by independent companies. Although the common-carriers remain a force in this market, the independent companies, which tend to specialize in all types of communications equipment, have in many instances attempted to establish more direct methods of selling to end-users. The increasing use of telecommunications has also brought the computer systems suppliers into this market on a larger scale. Apart from supplying communications processors and similar equipment designed to reduce the communications tasks of applications computers, they now supply terminal devices with built-in modems. This strategy may well enhance the presence of the computer systems suppliers in the related telecommunications equipment market.

It seems, therefore, that the dominant market position of the multinational computer companies varies from one segment of the computing equipment market to another. Their position is most dominant in general purpose systems, including, to a lesser extent, standard peripheral equipment. They also are a major factor in special-purpose systems and stand-alone peripheral equipment. They are least dominant in specialized peripheral devices and related telecommunications equipment, the market for which is relatively small. This is substantiated by the data in Table 5.6 which gives the number of companies participating in selected market areas.

It is apparent that for general-purpose computer systems competition is confined to the MNEs. However, the large number of producers of special-purpose systems and peripheral equipment, as well as the large number of models of virtually all systems and products, suggests a much greater degree of competition in these general market areas.

Table 5.6: The Estimated Number of U.S.-Based Computer Hardware Suppliers of Systems and Selected Products, 1973

System or Product	Suppliers	Models
General-purpose systems	9	108+
Minicomputers/microprocessors	67	167
Small accounting computers	38	118
CRT display terminals	65	162
Typewriter terminals	34	77
Remote batch terminals	44	72
Plug-compatible disk drives	10	34
Plug-compatible tape drives	9	53
Add-on main memory	18	21+
Optical readers	46	104
Computer output microfilmers	16	37
Digital plotters	19	54
Communications processors	33	79
Voice response systems	18	22

Source: Adapted by the Tariff Board from Datapro 70, Datapro Research Corporation, Delran, N.J., July 1974.

The market penetration of the independent companies is based in large measure upon specialization on particular product lines. Consequently, users are dependent upon the MNEs for most of their general-purpose, standard computing equipment. Unusual and specialized hardware requirements are generally met by the smaller independent computing equipment manufacturers.

Marketing and Competition

There are a number of characteristics of the market for and the marketing of computer systems and computing equipment which favour the large multinational suppliers and affect adversely the position of the smaller independent companies. The MNEs dominate the supply of computer systems. And it is the systems manufactured and sold by the MNEs that constitute the main market of the large number of independent companies. Without this customer base of systems provided by the large mainframe companies, the market for independently supplied peripherals would be largely non-existent. The independent companies, apart from those which supply special-purpose computer systems, depend, therefore, to a large extent upon the large mainframe companies for the creation and expansion of the market for peripheral equipment and must generally compete with them for a share of that market. In these circumstances, it can be seen that the independent suppliers are at an initial disadvantage.

Furthermore, the large computer companies, it is said, are better placed to serve the individual needs of the average user. Each user has different data processing needs and requires individual attention. Consequently, each supplier must have salesmen, systems engineers, software specialists, industry specialists, maintenance engineers and technicians in order to offer "full service" to users. In addition, the computer systems supplier needs to provide adequate systems software, technical manuals, and customer training and education, all of which require large commitments of resources on a continuing basis. Although many of these services can become self-supporting, their provision on the scale expected by users is very costly particularly for the independent computing equipment companies and particularly when the market for computing equipment is relatively small and geographically dispersed, as is the case in Canada.

Another factor is that computing equipment companies are generally more knowledgeable about equipment than their customers, so that the user relies on the supplier for support and advice. This gives the large multinational computer system supplier a decided advantage over the smaller independent in the market because he has the capability to provide a full range of these support services. It is not surprising, therefore, that the user has tended to rely upon the computer systems supplier for his complete hardware requirements, in spite of the knowledge that certain compatible devices could be obtained from an independent supplier at a lower price.

Another market advantage of large multinational computer systems manufacturers is the size of their customer base and the fact that they established this base well ahead of the smaller, independent, specialized computing equipment producers. A supplier's customer base

in the data processing hardware market is extremely significant. It usually places the supplier in a preferred position when the user considers the acquisition of new equipment. If a user is generally satisfied with equipment and services, there is little incentive to consider the products of competing suppliers. In fact, there may be disadvantages in switching suppliers of basic systems due to the existing investment of the user in application programs, and his familiarity with the equipment. Each supplier's system has unique features, such as mainframe architecture, coding structure and media formats. Industry-wide hardware standards do not exist, although some observers consider that IBM has imposed de facto hardware standards on the industry. The unique features of each supplier's system, however, make it difficult to transfer the application programs written for one system to a similar system of another supplier, thus inhibiting a knowledgeable user from undergoing a change of suppliers. This explains in large measure why the customer base of computer systems is often described as "captive".

It would be incorrect to conclude, however, that users do not change suppliers at all. The customer base of a particular company is continuously open to competition by other suppliers. The protection offered by equipment incompatibility is overcome in a number of ways. High-level programming languages (COBOL, Fortran) permit the user to operate a program on another supplier's equivalent system.(1) Certain suppliers provide programs that "emulate" competing systems of equipment. This software solution to incompatibility enables an applications program to perform as if it were being operated on the original system, though at some cost in efficiency. Furthermore, certain systems suppliers have largely adopted IBM's hardware standards, thereby minimizing the problems of changeover from the largest customer base in the market.

The market position of the various computing equipment companies is also influenced by their market coverage, that is, the extent to which a company supplies and services its data processing products geographically. It has been shown that the continuous interaction between the supplier and the user involves immense marketing costs. Clearly such costs, relative to sales, are least burdensome in the major cities where the largest concentrations of users are found, and are heaviest in the less populated areas. Because of the higher unit selling and servicing costs incurred outside the major cities, only the largest suppliers have the resources for a broad geographical presence. The smaller, independent suppliers are confined, largely of necessity, to the metropolitan centres. The degree of competition is probably greater, therefore, in those markets with the highest density of users of computing equipment; in other, more sparsely populated regions competition will be largely confined to a small number of the large computer system companies.

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(1) In practice, some re-programming may still be required before the application becomes operational on the alternative system.

An indication of the need to limit marketing efforts, at least initially, to a high user-density region was provided by the entry into the U.S. market, in 1974, of one of the leading European computing equipment suppliers, International Computers Limited. It decided to concentrate its marketing efforts initially on the New York City area, and did not intend to broaden its market coverage until it had consolidated its efforts there, or until it had joined forces with an American company which already had a U.S. sales and service network.(1)

Because of the depth of the U.S. market for computing equipment and the very size of its industry - it is likely that the selection of equipment and market coverage are greatest in that country. In most other national markets, such as the Canadian market, the products of the smaller U.S.-based companies are usually represented by agents or distributors which may not provide the same degree of coverage as in the United States.

Several elements enter into competition between individual producers. The importance of the availability of technical support services has already been noted. Another significant factor is the capability to meet the specific data processing needs of individual customers, to do that more effectively, and to meet new emerging needs. Product differentiation is also a major element of competition, and is associated with the total image of the firm. Companies in the industry attempt to impress upon users that their products, services and support are of better quality than those of their competitors. The user's perception of these differences is often sufficient to overcome a substantial price disadvantage, and evidence of lesser performance by the favoured product.

The price of a computer system and, to a lesser extent, of equipment, therefore, is but one factor which the purchaser considers. All of this is to suggest that factors other than price or price/performance ratios play an important role in competition between competing firms.

It is generally acknowledged within the industry that product pricing takes place within the pricing framework established by the largest firm in the industry, IBM. Other computer systems suppliers tend to price their comparable products at levels below those of IBM:

> As the industry leader, IBM sets the de facto standard in terms of pricing, giving its competitors the financial elbow room they need in order to adjust their own levels and still remain below IBM on a box basis.(2)

The independent peripheral equipment suppliers, less concerned with the need to supply software and other support services with their products, tend to price their products at levels below those of computer systems manufacturers.

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(1) Electronic News, Fairchild Publications Inc., New York, New York, May 19, 1975, pp. 1, 6.
(2) ibid., October 28, 1974, p. 14.

The extent to which suppliers adhere to published list prices appears to vary. IBM, as the largest firm in the industry, is under some constraints to adhere to retail list prices, lest it be accused of predatory pricing practices. Other suppliers may provide quantity discounts or special discounts where a high value of equipment is involved, or where a user requires little advice and support.

However, price is not always equated by the user with the best value, because the purchase of products of the complexity of computing equipment involves not merely the hardware, but other tangible and intangible factors as well. The provision of a number of man-years of programming assistance, or the free use of a data centre before equipment delivery, can become important considerations from the purchaser's viewpoint. The greater the reliance of the purchaser on the technical resources and expertise of the supplier, or the greater the user's expectations of support from a supplier, the less critical price becomes a factor in the selection process. Furthermore, although some units of equipment from different suppliers are directly comparable in terms of specifications and performance, there are probably many more that have at least slight variations such as to render the comparison of prices a difficult task to accomplish objectively. While price competition, therefore, exists in the computing equipment market, it is but one aspect of the overall competitive situation.

Barriers to Entry

Firms considering entry into the computing equipment market face formidable obstacles. They face barriers on the side of market development, such as high marketing costs and the largely captive nature of the customer base of existing companies. There are also barriers from the production side, namely, the scale of production and the need for, and high cost of research and development.

Market Barriers

The great diversity and technical complexity of data processing equipment entail very large expenditures in marketing and customer support. These costs, and the resources required to finance them, are high for established manufacturers but are especially demanding for newcomers. The new firm can minimize these marketing costs by initially restricting its market coverage; even then the new firm faces greater-than-average marketing costs per unit of equipment because of the need to establish its product. If the product competes directly with similar products already on the market, the new firm will face still higher market developments and marketing costs, and will at the same time have less flexibility with regard to pricing. This explains in large measure why most new suppliers of computing equipment attempt to avoid direct competition and opt, wherever feasible, for unexploited gaps in the product spectrum.

High initial marketing costs can be avoided by distribution through the sales and marketing network of an existing supplier. This strategy has been used, for example, by Consolidated Computer Inc., whereby the distribution of its data entry systems outside North America has been undertaken through arrangements with International

Computers Ltd., Fujitsu Ltd., and certain other distributors. The CCI data entry systems have become items in the product lines of the two computer systems suppliers, and their associated marketing costs have been largely absorbed within the total marketing costs of these two firms. Although such arrangements reduce marketing and support costs, they also lessen the extent to which the new firm can directly influence the demand for its products in the markets concerned.

The customer base of the established computer equipment companies constitutes a formidable barrier to entry into this industry, especially with respect to computer systems. Some of the very largest firms in the industry had established customer bases, as early as the 1920s. Both IBM and Univac have had extensive involvement in the market for tabulating equipment, and both have benefited from patent rights relating to punch cards. Similarly, NCR and Burroughs have had extensive connections with the business equipment industry, primarily through the manufacture, sales and servicing of bookkeeping machines, in which they retain a strong interest. These companies had the advantage of having a customer base and sales organization for their previous equipment which greatly facilitated the entry into computer systems and computing equipment. Some are of the opinion that a customer base may be more important to a supplier than technology:

> The importance of a captive customer base as a barrier to entry can be illustrated by the following facts. Of the firms that entered the computer industry in the 1950s, the business equipment manufacturers (IBM, Remington Rand Univac, Burroughs, ICT, Bull) had the customers and the market, whereas the electronics firms (RCA, Elliot, Ferranti, GE, English Electric, Philco) had the technology. If we judge from the record of the firms, having the customers was more important than having the technology, except perhaps for Honeywell whose field of activity was scientific instruments. It is significant that ICT, the only profitable European computer manufacturer, and one of its predecessors, BTM (British Tabulating Machinery Company), also had a virtual monopoly of the British and Empire markets for punched-card equipment by virtue of BTM's agreement with IBM (until 1949), which gave it the sole agency for IBM equipment in the United Kingdom and parts of the British Empire ... Compagnie des Machines Bull, which, until its fall, was the only serious continental contender to IBM, also had a strong position in the punched-card market.(1)

This does not explain, of course, the success of companies, such as Digital Equipment Corporation and Data General Corporation, which specialized initially in minicomputers, and which did not have the benefit of an established customer base. However, these companies initially produced minicomputers only, which at the time of their introduction in the 1960s represented new and unique products, ideally suited to process control and other dedicated tasks. They were not

(1) Hu, Y.S., The Impact of U.S. Investment in Europe, Praeger Publishers Inc., New York, New York, 1973, p. 80.

designed to compete with general-purpose computer systems, and it is only very recently that these special-purpose systems have been considered for, and have been capable of, general-purpose computing. The customer base established by minicomputer suppliers was quite separate from those previously existing and exploited by the larger, general-purpose computer system suppliers. Consequently, at the present stage of computing technology, there are captive customer bases among both special-purpose and general-purpose computer users, with some degree of overlap between the two. For new computer systems suppliers, these represent formidable barriers to entry.

For new firms considering entry into the market for peripheral and related telecommunications equipment, the barriers appear less formidable. Although the computer systems supplier is at an initial advantage by providing a system or mainframe, the user thereafter becomes a prospective customer for the independent supplier. This is particularly true when the user contemplates the expansion of his system, at which time a choice can be made between independently supplied plug-compatible peripherals and the standard peripherals of the systems supplier. The act of becoming a user of a computer system also provides a new market opportunity for independent suppliers of stand-alone peripherals and, where required, specialized peripherals and related telecommunications equipment. New entrants may be inclined to minimize the risk of competing directly with the systems suppliers by producing specialized peripherals and related telecommunications equipment; areas in which the major companies have shown less interest. On the other hand, the presence of a number of independent producers of standard plug-compatible and stand-alone peripherals suggests that the barriers to these larger market areas are also not insurmountable.

One further problem to be resolved by the new firm is for which system or family of systems to make his peripheral devices, a problem confined to standard or special plug-compatible equipment, not stand-alone peripherals. An add-on memory module designed for an IBM system generally cannot be used for a Honeywell system, and vice versa. Although certain interfaces can sometimes be designed to overcome this problem, it appears that most independent peripheral equipment suppliers offer peripherals that substitute for those of a particular manufacturer, such as IBM. Having designed standard or special peripherals for a particular brand of computer system, however, the new firm is then committed, at least for some time, to that brand. Independents producing peripherals compatible with the system of a particular company run the risk that the latter will change the design of its mainframe interface specifications or introduce new peripheral devices with better price/performance ratios.

Production Barriers

From the production side the most important obstacle to entry is scale, which is related to market development and distribution. Production, per se, appears to have few impediments, as indicated by the proliferation of products on the computing equipment market. Components in either discrete or module form are readily obtainable and these components, it has been suggested, can be easily assembled and integrated into a workable computing device by any competent electronics engineer. Although this may be an oversimplification, the actual construction of a unit of equipment appears to present few problems. Much more at issue is the ability to produce equipment in quantity, at the lowest possible cost, and to respond to advances in technology.

Scale of production is a major determinant of the cost of producing equipment. The ability to produce in large quantities gives rise to several types of economies, including: lower production input costs through bulk buying, more automated production techniques, fewer model change-overs, and greater potential for labour force productivity increases due to job specialization. The new firm may at first be confronted by a limited market and, hence, must accept low volume and high cost production. At the same time marketing costs relative to sales are high as well.

The volume of sales or production is also important from the viewpoint of sustaining an adequate research and development effort. A new firm in the computer hardware industry must devote a substantial portion of its revenues to research and development in preparation for future products and in improving current products. The magnitude of expenditures required, on the basis of industry reports, may be as high as from 5 to 10 per cent of revenues, although some portion could be funded by government. Nevertheless, even expenditures in the order of 3 to 5 per cent of revenues devoted to a function for which returns will not be evident for some years, represent a significant barrier to the firm planning to enter this industry.

CORPORATE STRATEGIES AND ACTIVITIES

The previous section has shown that the large, U.S.-based MNEs dominate the international market for computing equipment. The evidence suggests that Canadian-owned companies have difficulty in establishing themselves in the Canadian market indicating that the structural factors referred to above play significant roles in those national markets where the MNEs are active. The fact that even some of the small Canadian-owned companies export a proportion of their production tends to confirm the contention that the Canadian market for computing equipment, by itself, is too small to support a manufacturer dedicated to this market. Given this situation, the strategies and activities of the MNEs in terms of production, research and development, and certain aspects of marketing take on added significance.

This section explores three aspects of corporate activity, and is concerned mainly with the perceived strategies of the MNEs. Production location strategies are first discussed in terms of subsidiary companies in host countries. Attention is then directed at the extent of vertical integration apparent in MNEs, and, within this context, the opportunities for parts suppliers to provide them with production inputs. Thirdly, some of the cooperative arrangements among manufacturers and suppliers are examined because they appear to be becoming more prevalent in this industry, and may be an effective method of establishing a market presence.

Rationalization

The movement away from the "branch plant" status of subsidiary companies in host countries to their roles as fully integrated units serving a continental or world market has probably attained its most advanced form in the computer industry. The term "branch plant"

implies a subsidiary company established to manufacture within the host country, primarily for sale in that market, most or all of a range of products produced by the parent company. It also suggests, on a smaller scale, a replica of the parent company's facilities and organizational structure. In contrast the rationalized, fully integrated, manufacturing subsidiary is usually concerned with not more than two or three products or subassemblies, and is allocated a market area extending well beyond the host country. Thus, it achieves economies of scale and costs of production comparable to those of other plants of the parent company, wherever they may be located. It is mainly these considerations of scale and cost that have encouraged the rationalization of production in the computing industry.

Within the context of the international computer industry, the problems of supplying and supporting relatively small national markets from a small number of production centres are not insurmountable, even with a great number and large variety of products. However, an MNE is usually under pressure to manufacture some or all of its products within its major national markets. The pressure may arise by way of import restrictions, tariffs, governmental decree, or "good corporate citizenship". The solution that has evolved is embodied in the rationalized manufacturing subsidiary that produces but a small fraction of the total product line marketed by the parent company, but which exports perhaps as much as 100 per cent of its production. Under this strategy, manufacturing unit costs are reduced by the greatly increased scale of production, and other economies are obtained through the elimination of duplication. At the same time, the domestic market continues to receive the full variety of products available internationally, at prices that differ from international levels mainly by the incidence of tariff and taxation factors imposed by the importing country. In Canada, these price differentials are augmented by other costs related primarily to the higher cost of distribution and customer support in a relatively small and geographically dispersed market.

Chapter IV indicates that Canadian subsidiaries are increasingly becoming fully integrated rationalized units. The manufacture by Control Data Canada Ltd., of its medium and large scale Cyber 170 mainframes represented the first Canadian venture into this scale of computer. The manufacture of rotating memories by Burroughs Corporation represented another process involving high technology not previously undertaken in Canada. The manufacture by IBM of its System/32 desk-sized computer in Canada, at the smaller end of the size spectrum, nevertheless represented a return into computer systems, in addition to support products. Univac provides another example of rationalized production with its manufacture in Canada of power supply units. The total production of these units is shipped to foreign Univac plants for incorporation into various Univac computer systems and devices.

The decision to locate the production of a new system or subsystem with a particular subsidiary appears to rest upon several criteria, some of which are related to corporate policies and strategies, others to more pragmatic considerations. Differences in approach are evident among MNEs, and changing circumstances within the economy or industry also add a further dimension to the production location decision. By and large, however, the criteria that affect the production mandates of the MNE subsidiaries appear to be reasonably common. In the Board's view they include the following:

Market Demand - The expected demand for the product in the allotted market area will play a large role in the production location decision.

Excess Productive Capacity - If a choice is to be made among a number of plants, other things being equal, production will be located in that plant having excess capacity at the time of new-product commencement.

Host Country Environment - The production location decision appears to be affected by measures enacted by the government(s) of the host country, and by the general business climate that prevails. The measures may range from coercive to inducive, and would be weighed by the MNE against the conditions prevailing in alternative host country locations.

Balance of Payments - It appears to be generally accepted that balance of payments considerations play a significant role in production location decisions. A subsidiary that has acquired a significant share of a host country market, but which incurs a large and continuing visible trade deficit, will feel constrained by the potential imposition of corrective measures by the host country government to curtail the deficit in order to maintain its market share.

Management Initiative - Some studies suggest that the senior management of a host country subsidiary is beginning to play an increasingly important role in determining the extent and nature of the production undertaken in the host country. The implication is that a dynamic, aggressive and forward-looking management would obtain more beneficial production location decisions in their favour, than would the managements with less initiative in related subsidiaries.

Expertise and Experience - In those MNEs which induce a competitive posture among subsidiaries by calling for competitive production bids, previous experience in keeping costs in line with estimates, and success in producing quality products profitably and on time, would be factors in obtaining a new product mandate.

According to an official of IBM World Trade Corporation, that company bases its decisions on production locations outside the United States on three criteria: "First, the size of the market ... Secondly, for balance of payment reasons ... And third, for cost of manufacturing."(1)

Vertical Integration

Vertical integration refers to the extension by one corporate management into all the various stages of producing and marketing a particular product. It is usually contrasted with horizontal integration which describes an extention of the activity of a firm by adding different products. Vertical integration for the computing equipment industry would realistically include the manufacture of parts, components and subassemblies and supplies and materials, the assembly of

(1) Gilbert E. Jones, Chairman of IBM World Trade Corporation, Report on Multinational Corporations, Hearings before the Subcommittee on International Trade of the Committee of Finance, United States Senate, March 1, 1973, pp. 262-263.

computer mainframes and peripherals and related telecommunications equipment and the retail distribution of the equipment. It would also include functions such as manufacturing process research and development, product research and development, and parts and product design and engineering.

The marketing process of computing equipment firms and the end-products produced by them have already been discussed previously in this chapter. Of primary concern here is the extension by these companies into the manufacture of parts and components. The extent to which this has already occurred is important because it indicates how much of the market for parts, components and subassemblies is captive and how much is available to independent parts manufacturers. Parts, components and subassemblies are by far the largest element in the factory cost of production of computing equipment, some two thirds of the total for the Canadian industry.(1)

The decision to produce or purchase a particular part or component is usually made at the completion of the design stage for a new product. Then the specifications have been established and it is at that point that a parts supplier is invited to discuss the feasibility of meeting projected specifications and unit prices. The vertically integrated manufacturer will subsequently decide to make or buy the part on the basis of internal and external cost differences, and on internal productive capacities and capabilities. Other factors, such as the nature of the part, whether it is proprietary, or whether the process in which it is used is proprietary, its commonality throughout the industry, and its absolute and relative value, all have a bearing on the make or buy decision.

It should be noted that new products, even in the dynamic computer industry, normally do not constitute radical departures from previous designs. The so-called "new generations" of equipment have been evolutionary in nature, with emphasis placed by the manufacturer on the standardization of parts wherever possible throughout each system range, and throughout families of systems. A "new" data terminal, for example, designed for increased speed of operation, may well retain the same keyboard, cathode ray tube, and other elements common to its predecessor. Similarly, a data card feeding device that has worked satisfactorily through the years may be utilized in many peripheral devices of a "new" computer system. Thus, although a new generation of equipment may employ new technologies, such as a change from ferrite core to semiconductor memory, many parts or assemblies may be common to those used in older generations.

Since the decision to purchase parts occurs most frequently during the design or re-design stage, the extent of product design carried out by computing equipment manufacturers in Canada is a significant factor for Canadian parts suppliers. As indicated in Chapter IV, expenditures on research and development in Canada, including new product design by U.S. subsidiaries, are only a small fraction of the total effort in the United States. Research and development by the Canadian industry has primarily been a matter of adapting hardware of foreign design to Canadian circumstances, and not of designing

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(1) Chapter VIII, p. 241

original equipment. The Board's visits to manufacturers have tended to confirm that very little in the way of original product design for computing equipment is undertaken in Canada.

The Science Council has commented extensively on the lack of design and engineering activities among many types of manufacturers in Canada, and views the absence of "demand-pull" by these manufacturers as a serious impediment to the establishment of an innovative and viable electronic components industry:

> At the present time, that 'demand-pull' in Canada is very much smaller than the intrinsic size of our market would indicate. Because we do so little of our own design and engineering, there are too few customers with whom would-be innovators in semi-fabricated materials can get directions, stimulation and incentive ... New products are developed in response to needs, and needs for parts and semi-fabricated products will always appear first where end products are developed, engineered and built. In Canada, the requirements and specifications for new parts and materials are likely to be known to the potential innovator a year after they are in use in production, rather than two years before, as it is the case in the country where the product is engineered.[(1)]

The demand-pull created by Canadian-owned computing equipment manufacturers also tends to be minimal. These firms because of their small volume of sales tend to design a new product around existing components which are often purchased "off-the-shelf" from a parts distributor, without contact with the parts supplier. Moreover, their operations frequently consist of the assembly of subassemblies, such as a disk subsystem, for which there may not be a Canadian manufacturer. Although there are many other obstacles to be overcome before a Canadian parts manufacturer is able to compete successfully in the Canadian market, the dearth of original end-product design may well be the key factor, as it is the basis for the essential relationship between the computing equipment product and the parts manufacturers.

Recent technological developments with respect to electronic parts may have diminished the extent to which computing equipment companies are involved in parts production. Since about 1970, discrete electronic elements in computing equipment have been increasingly displaced by integrated circuits that incorporate in miniaturized form the transistors, resistors, capacitors, diodes, etc., of earlier years. Large scale integration (LSI) has enabled further advances to be made in microminiaturization. At the present time, the technology centres upon semiconductor devices which were developed in the United States, primarily by companies with experience in the development and manufacture of transistors and other electronic components, and not by computing equipment manufacturers. Some of these companies have since extended their parts manufacturing into the production and marketing of end-products such as microcomputer systems, intelligent terminals, electronic calculators and electronic watches.

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(1) Pierre L. Bourgault, Innovation and the Structure of Canadian Industry, Science Council Special Study No. 23, Ottawa, October 1972, pp. 126-127.

While some MNEs, most notably IBM, have also undertaken semiconductor research, the semiconductor companies are said to be maintaining their technological lead. Moreover since these high-technology devices have wide-ranging uses, the volume and scale of production realized by the parts manufacturer would, with the possible exception of IBM, exceed that of any single computer company considering production of its own requirements only. It is apparent that most of the large MNEs do not manufacture their total requirements of advanced electronic parts.

The Canadian computing equipment industry purchases nearly all requirements of high-technology electronic parts, and virtually all requirements are imported. Where electrical or electronic parts of a more generalized nature are concerned, a similar situation appears to exist. Visits by the Tariff Board to Canadian plants of certain MNEs indicated that the wire, for example, used to interconnect memory plane and other panels in CPUs, was purchased from specialized manufacturers in the United States. Other electronic parts were supplied by the parent company, but at least some portion of these had also been originally obtained from U.S. parts manufacturers.

Computing equipment suppliers have generally refrained from extending their operations to the manufacture of metal housings, stampings, and plastic mouldings. Traditionally, even vertically integrated companies have tended to concentrate their manufacturing in areas of known expertise, and have bought, rather than manufactured components of this nature. As far as can be determined, this seems also to be the situation with both large and small computer manufacturers. While the technology involved in many of these parts is comparatively low, their relative value in end-products is increasing due to the decreasing costs of electronic components. It is with respect to these non-electronic parts that Canadian parts suppliers have been most successful in supplying the Canadian computing equipment industry.

One factor which has encouraged vertical integration is proprietary parts and processes. The Board has learned that many parts manufactured by certain MNEs, have been developed through costly and time-consuming internal research. These parts are normally patented, and become proprietary to the MNE. Furthermore, even non-proprietary parts may be manufactured internally in order to avoid revealing a proprietary manufacturing process. The existence of these factors undoubtedly limits the market potential for independent computer parts manufacturers.

The availability of parts from independent parts suppliers, and their quality and price are, understandably, important considerations for the equipment manufacturer in deciding whether to purchase or produce them. These aspects were explored by the Board with a number of end-product manufacturers, including Canadian subsidiaries of MNEs and Canadian-owned companies.

The quality of a part, or its reliability with respect to performance, was invariably deemed to be of prime concern. It was noted that, while reliability requirements vary, computer systems and related telecommunications equipment generally require reliability

levels of a high order. Furthermore, the fact that the end-product might be installed in any one of many foreign locations, with greatly varying conditions and a level of service inferior to that in the domestic market, implies the need for consistent quality and reliability. A major concern of computing equipment manufacturers with respect to the availability of parts was timely delivery to meet production schedules, and the capability of the parts supplier to provide quick replacement of parts that fail acceptance or assembly testing. Firms that cannot meet these conditions could not be expected to become, or remain, suppliers to the computer industry. Prices, while not always the prime factor, are undoubtedly also an important consideration.

The position of Canadian firms as parts suppliers to the MNEs, either to local subsidiaries or parent companies, appears to be difficult: there is the overall limitation of the degree to which the parent company has already integrated parts production into its global operations; there is the problem that little product design and engineering is undertaken in Canada; and there is the further problem that Canadian parts suppliers may not be as technologically advanced as U.S. parts producers, particularly with respect to electronic parts.

The Board was informed by a number of MNE subsidiaries that they have made an effort frequently with the assistance of the federal Department of Industry, Trade and Commerce, to find independent parts manufacturers with the potential to supply their requirements. It was also stated that they have co-operated with these firms in order to promote conditions within the parts manufacturers' environment that would enable these requirements to be met. However, lack of capacity, unsatisfactory delivery, inadequate reliability and non-competitive pricing were reasons cited as frequently preventing Canadian sourcing of parts. With respect to price, it was felt that if Canadian parts suppliers were competitive, that is to say within 3 or 4 per cent of a foreign competitor's price, and quality and availability were comparable, then the Canadian suppliers would be favoured.

The Tariff Board survey indicated that a small proportion of the parts used in the production of finished products had been obtained in Canada. It was found, however, that these parts consisted very largely of low technology items, including various materials, that originated with a number of diverse industries. Some high technology parts were obtained from parts distributors in Canada, but it is believed that most of these had been imported.

Cooperative Arrangements among Companies

In terms of corporate strategy, an important development in the computer hardware industry has been the emergence of intercorporate arrangements whereby two or more companies have embarked upon a joint course of action for mutual benefit. These collaborative agreements have as their objective the achievement of economies in research and development, in production, and in marketing.

Collaboration in research and development may result in substantial savings in an industry noted for its high expenditures in this area. It may also bring together complementary or supplementary technological expertise which may result in a more effective research and development effort.

Cooperative agreements in production are aimed primarily at lower production costs due to economies of scale resulting from the rationalization of output. Each partner to the agreement may produce the combined requirements of a part, subassembly or end-product of all partners to the agreement. The products may be identical in all essential respects, bearing either a combined identification or separate company insignia. The rationalization and specialization of production frequently takes advantage of the expertise in production technology of each partner.

Joint marketing and service activities are undertaken in order to lessen the very heavy expenditures associated with direct supplier-user interaction. The establishment and maintenance of a national, or larger, network of sales and service offices is a highly expensive undertaking. Although distributors play a role in certain product lines or in certain national markets, direct selling is the rule rather than the exception in marketing computing equipment.

The size of companies engaged in cooperative arrangements varies considerably, and various combinations of small, medium and large companies are in evidence. The MNEs collaborate primarily with respect to research and development and production, whereas the smaller companies cooperate mainly in marketing and servicing. The following are some examples of cooperative arrangements:

<u>CDC-NCR-ICL</u>

Control Data Corporation and NCR Canada Ltd. established Computer Peripherals Inc., in 1972, to develop and manufacture certain classes of computer peripheral devices for sale to the parent companies. In 1974, International Computers Ltd., Britain, became an equal partner in Computer Peripherals Inc.

<u>CII-Philips-Siemens</u>

In response to pressures for an all-European computing capability, the Compagnie Internationale pour L'Informatique of France, Philips of Holland and Siemens A.G., of Germany, formed the UNIDATA company to integrate their computer operations. From a combined 9 per cent of the European computer market in 1974, UNIDATA aspired to obtain 20 per cent by 1980. (CII appeared to withdraw from this arrangement in 1975 to form a company with Honeywell Information Systems in Europe. The future of UNIDATA remains in doubt.)

<u>CDC-IBM</u>

Following the settlement of Control Data's suit against IBM in 1972, the two companies agreed to conduct certain joint research and development efforts, towards which IBM will contribute some $30 million.

Sycor-Olivetti

Sycor Inc., a manufacturer of intelligent terminals, collaborated with Olivetti, a company with an established sales organization and market base, to provide access to most of the world's markets for its terminal. A similar arrangement was entered into with the Mitsui Co., for the Japanese market. These arrangements have been credited with providing Sycor the opportunity to establish its own domestic sales organization.

Gandalf-Penril

Gandalf Data Communications Ltd., of Ottawa, a manufacturer of short-distance modems and other related telecommunications equipment co-operated with Penril Data Communications of the United States, whereby each company acts as agent for the other's products in their home territories. Large sales increases have been attributed to this arrangement.

Univac-Saab-Scania

Univac, a U.S.-based MNE, joined in a venture with Saab-Scania, a Swedish manufacturer of computing equipment, to market and service their computer systems and products in Scandinavia.

These cooperative agreements are typical of the many that exist world-wide in the computing equipment industry. Similar arrangements are to be found for certain software products, whereby successful application packages designed by a software company for a particular MNE's system may be marketed by that MNE on a world-wide basis. Cooperative arrangements of the types cited between competitors in the computer hardware industry have in some instances been encouraged by European governments in an effort to counteract IBM's dominance in many market segments.

SUMMARY

An examination of certain facets of the structure of the international computer hardware industry reveals that the MNEs dominate the markets for computing equipment. World-wide, they accounted for in excess of 80 per cent of total revenues in 1973. In Canada, these same companies accounted for in excess of 90 per cent of Canadian market revenues.

The industry appears to be highly concentrated, with eight companies accounting for some 81 per cent of the revenues of all U.S.-based suppliers in 1973. IBM is by far the largest company in the industry, accounting for an estimated 49 per cent of total revenues in that year. These market shares are unlikely to have changed substantially since that time.

The domination of the markets by the MNEs is most evident in general-purpose computer systems, and is less pronounced where special-purpose and small accounting computer systems are concerned. Within the study period, two general-purpose computer systems

suppliers, Xerox and Singer, withdrew from the market; two other large suppliers, GE and RCA, had also withdrawn at an earlier stage. This indicates that even the very largest firms have encountered severe difficulties in competing in the general-purpose systems market. The high rates of growth in the market for computing equipment in the 1960s attracted a large number of independent producers to the industry. Many of them appear to have competed successfully in certain types of peripheral equipment and related telecommunications equipment. Their average total revenues, however, fall far short of those of the computer systems suppliers.

The existence of a large number of suppliers of computing equipment, combined with a wide range of models, suggests that the market is highly competitive. On the other hand, the market coverage by many of the smaller suppliers tends to be limited to specific geographic areas, thus augmenting the market power of the computer systems suppliers among lesser concentrations of users. Product differentiation also tends to favour the larger suppliers.

Although there still remain opportunities for the entry of new firms, particularly those with unique products that do not compete directly with the products of the computer systems suppliers, the market barriers to entry appear to be formidable. The key obstacle is high marketing costs which is related to and is derived in part from the captive customer bases that exist. This barrier has arisen because of the necessity for suppliers to serve users directly. Until such time as the computer becomes far less complicated to understand and to use, thereby reducing the dependence of users on suppliers, it is likely that high marketing costs will deter many potential entrants to the industry, and will lessen the opportunities for growth of the smaller suppliers. Market barriers to entry are considered to be far more formidable than those relating to production. In this regard, a respected observer of the industry has gone so far as to suggest that:

> Developing a position in the computer market is a business problem not a technological one. Technology is an essential ingredient, but not enough. Spending freely to help a national effort in technology may have its own values, but it will not provide a country with a viable computer industry ... Knowing how to apply computers effectively is as great a national asset as manufacturing them.[1]

The market dominance of the MNEs gives an added significance to their strategies and activities in host countries. Most appear to have adopted a rationalized approach to production, with factories producing a very limited range of equipment for large market areas that transcend national borders. Their production location strategies seem to be based upon a combination of criteria, the chief of which may be the relative significance of the host country market, and its environment for producing computing equipment.

(1) John Diebold, letter to the Editor, The Economist, London, October 18, 1975, p. 4.

The degree to which the computer systems manufacturers are vertically integrated appears to increase with the size of the corporation. The opportunities that they provide to parts manufacturers for supplying production inputs in host countries, and to their parent companies, are constrained by considerations of design, quality, price and patents. In Canada, the lack of demand-pull created by original end-product design may be a key structural factor.

A noticeable feature of the computer industry in recent years has been to emergence of collaboration between various companies. These cooperative arrangements are evident in research and development, in production, and in marketing.

It is apparent that the Canadian market, because of its domination by U.S.-based MNEs, is an integral part of the world market for computing equipment. For many of the reasons cited in this chapter, Canadian-owned companies have failed to gain as significant a share of the Canadian market as, for example, United States independent suppliers have gained of the market in the United States. At this stage of development of the computer hardware industry, the entrenched positions of the major systems suppliers in the Canadian market implies that the relatively small Canadian-owned hardware suppliers face severe difficulties in expanding or even retaining their market shares.

CHAPTER VI: GOVERNMENT POLICY AND SUPPORT

CHAPTER VI: GOVERNMENT POLICY AND SUPPORT

This chapter reviews Canadian government policy and support for the computer hardware industry in order to measure the thrust and direction of general industrial development policies when changes to the tariff schedule are considered at a later stage in this report.

GOVERNMENT POLICY

Federal Government Policy

Policy relating to the computer hardware industry is of concern to a number of federal government departments and agencies. The prime responsibility for policies and programs regarding hardware and industrial development rests with the Department of Industry, Trade and Commerce. Telecommunications aspects are the responsibility of the Department of Communications. Other departments are concerned with such areas as computer software copyright, competition in the provision of computer services and procurement of hardware and services for the federal government.

By 1970, a number of issues had arisen, particularly with regard to the increasing use of computers in conjunction with telecommunications, which tended to transcend departmental boundaries, and which appeared to require a more concerted policy approach from the many departments involved. The Canadian Computer/Communications Task Force was established by the federal government in order to examine these issues and to recommend appropriate courses of action. The report(1) of the Task Force became the basis for the development of a position statement by the federal government, which was published in the form of a green paper.(2) Apart from the statements of policy contained therein, an important mechanism in the form of an interdepartmental committee was established in 1973 that recognized the need to coordinate the various policy and program responsibilities of the federal government departments concerned. A small secretariat was also established in order to facilitate the work of the committee, and to provide effective liaison with provincial government officials and with the private sector.

The green paper presented the position of the federal government in 29 statements, grouped under five headings: general policies, data communications policies, industrial development policies, new computer communications systems and applications, and coordination of federal government activities in computer communications. Of prime interest to this Reference are two of the industrial development policy statements, Numbers 19 and 20:

(1) Branching Out, Report of the Canadian Computer/Communications Task Force, Department of Communications, Ottawa, May 1972.

(2) Computer/Communications Policy - A Position Statement by the Government of Canada, Department of Communications, Ottawa, April 1973.

> The government endorses the need for selective stimulation of the Canadian computer industry, and particularly the Canadian-controlled computer industry, and will take this into account in the formulation of its industrial, procurement, and science policies. These policies will be supportive rather than protective in nature and will aim at selected excellence.
>
> To assist in the growth of the computer and communications facilities and services to the benefit of Canada, the government procurement policies in this area will emphasize stimulation of the Canadian computer and communications industries, and particularly the Canadian-controlled computer-service industry.(1)

Within the interdepartmental committee, a number of working groups have been established to examine specific areas of concern and to formulate more specific policies within the over-all framework set out in the green paper. An example is to be found in a statement of government policy concerning computer communications and the payments system.(2) It is understood that as more specific policies concerning the Canadian computer hardware and computer service industries are formulated, they will reflect the general intent of the above statements.

Another important influence on the formulation of federal government policy has been the work of the Science Council of Canada. The Council has issued a number of reports concerning computers, communications and the structure of Canadian industry. In the present context its report(3) on strategies of development for the Canadian computer industry is perhaps the most germane. Among the report's principal conclusions are three that relate to the development of a hardware industry. First, it was concluded that Canada's best hope for developing an indigenous computer hardware industry lies in specialization, particularly in the manufacture of minicomputers or of communications-related peripheral equipment. Secondly, it was concluded that where government grants are used to encourage activities by foreign-controlled firms, they should be tied to Canadian equity participation in those firms, and that foreign take overs of Canadian-controlled companies should not be permitted. Thirdly, it was concluded that tariffs should be formulated in such a way as to improve the performance of the Canadian computer industry in areas such as R & D and manufacturing at a higher level of sophistication and complexity.

Many of the documents referred to, perhaps because of their terms of reference, tend to place much of their emphasis upon issues arising from the utilization of computers in conjunction with telecommunications, having in mind the rapid growth of computer communications

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(1) ibid, p. 13.
(2) Towards an Electronic Payments System, Government of Canada, Ottawa, 1975.
(3) Science Council of Canada, Strategies of Development for the Canadian Computer Industry, Report No. 21, Ottawa, September 1973.

throughout the social and economic fabric of Canada. There has thus been less emphasis placed upon questions relating to the production of hardware and to the position of Canadian hardware technology; but the general thrust of the policy statements makes clear the concern expressed for maintaining a Canadian presence in these areas. At the same time, as noted in the green paper, measures of support are seen to be more appropriate than measures of protection.

Provincial Government Policy

To the Board's knowledge, no provincial government has published policy documents concerning the computer hardware industry. Since the publication of the federal government's green paper, however, there has been an increasing involvement on the part of provincial government officials in discussions with federal government officials on policy towards this industry. It is understood that these discussions have centred mainly upon telecommunications and computer service industry aspects; but it is also known that the provinces share an interest in the expansion of the industry, and in the establishment or growth of regional facilities.

GOVERNMENT SUPPORT

Federal Government Support

Federal government support for the computer hardware industry has been undertaken through the use of a number of industrial development programs. Most of these programs have been available for a number of years, and none is directed specifically at the computer hardware industry. Table 6.1 identifies those support programs used by this industry, and describes briefly the purpose of each program, the limits of support, and the eligibility criteria.

Table 6.1: Federal Government Industrial Development Programs Used by the Computer Hardware Industry, 1969 to 1973

Dept. Name	Program Name	Purpose	Limit of Support and Eligibility
Department of Industry, Trade and Commerce[a]			
	Defence Industry Productivity Program		
	(DIP)[1]	To improve the applied research and development capability of Canadian industry for technological products related to defence.	Up to 50% of development costs. Canadian defence industry.

Dept. Name	Program Name	Purpose	Limit of Support and Eligibility
Department of Industry, Trade and Commerce[a] (cont.)			
	Defence Industry Productivity Program (cont.)		
	(DIP)[2]	To improve the capability of Canadian industry to meet exacting military standards.	Up to 50% of the costs of production equipment and an interest free loan for 5 years for the remaining 50% of the cost. Canadian defence industry.
	(DIP)[3]	To assist industry with the expense of proving itself as a source of military equipment to military allies.	Up to 50% of pre-production expenses including prototypes. Canadian defence industry.
	Industrial Design Assistance Program		
	(IDAP)	To improve the competitive position of Canadian industry by achieving improvements in the quality of industrial design of its products.	Up to 50% of industrial design costs. Companies incorporated in Canada.
	Industrial Research and Development Incentives Act		
	(IRDIA)	To expand scientific research and development in Canada which, if successful, is likely to benefit Canada.	Grant of 25% of new capital expenditures and 25% of the increase in current expenditures over the average of the five preceding years. Companies incorporated and carrying on business in Canada.
	Program for the Advancement of Industrial Technology		
	(PAIT)	To encourage industrial growth and efficiency by supporting the development of new or improved products and processes for commercial markets.	Shared cost, normally 50% of current costs and non-capital pre-production expenses. Canadian manufacturing and processing companies.

Dept. Name	Program Name	Purpose	Limit of Support and Eligibility
Department of Industry, Trade and Commerce[a] (cont.)			
	Program to Enhance Productivity (PEP)	To encourage industrial growth and productivity by supporting studies to determine the feasibility of projects designed to enhance substantially the productivity or efficiency of companies.	Shared cost, normally 50% including fees incurred through contract for consultants. Canadian manufacturing and processing companies.
	General Adjustment Assistance Program (GAAP)	To assist Canadian manufacturing industry to improve its position in meeting international trade competition.	Insurance of loans; direct loans; grants up to 50% of cost of consulting assistance to develop restructuring proposals. New and existing manufacturers in Canada.
	Program for Export Market Development (PEMD)	To bring about a sustained increase in the export of Canadian products. A. Incentives for participation in projects abroad. B. Market Identification and Marketing Adjustment. C. Participation in Trade Fairs. D. Incoming Foreign Buyers	Incentives in the form of repayable contributions to approved expenses that would otherwise inhibit marketing endeavours. Canadian companies.
	Promotional Projects Program (PPP)	To promote the export of Canadian products and services through trade fairs, missions, shows, and training.	Assistance varies according to the promotion. Each exhibiting company pays a percentage share of the actual total costs. Canadian companies with export capability seeking markets in other countries.

Dept. Name	Program Name	Purpose	Limit of Support and Eligibility
Department of Manpower and Immigration			
	Industrial Training Program		
	(CMITP)	To encourage employees to establish or improve training programs; to expand employment opportunities; to alleviate skill shortages; to prevent lay-offs; to support regional industrial development strategies.	The reimbursement of varying proportions of direct training costs, including: instructors' wages, travel and living expenses, training aids, rental of premises, course fees; and also trainee wages. Primarily private-sector employers and employer-associations.
Department of Regional Economic Expansion			
	Industrial Incentives Program (Regional Development Incentives Act)		
	(RDIA)	To increase or maintain employment opportunities in regions and areas requiring special measures to facilitate economic expansion and social adjustment.	Grants of up to $30,000 per direct job created; up to 50% of capital employed; up to 25% of approved capital costs plus $5,000 per direct job created; loan guarantees. New and existing manufacturers.
Department of National Defence (Defence Research Board)			
	Defence Industrial Research Program		
	(DIRP)	To promote and improve the research and technological capability of Canadian industry for selected applied research projects in technologies of relevance to defence.	Normally 50% of over-all direct costs of the project. Companies incorporated in Canada.
National Research Council of Canada			
	Industrial Research Assistance Program		
	(IRAP)	To increase the calibre and scope of pure research in Canada in situations where it leads to high business effectiveness with economic and/or social benefits in Canada.	Salaries of researchers. Companies incorporated in Canada. Canadian enterprises.

Dept. Name	Program Name	Purpose	Limit of Support and Eligibility
Export Development Corporation			
	Export Development		
		To insure Canadian firms against non-payment when Canadian goods and services are sold abroad.	Coverage normally up to a maximum of 90% of the amount of the loss with the exporter required to assume the remaining 10 per cent. All persons carrying on business in Canada.

(a) There are no formal subdivisions in the DIP program, but DIP(1) represents research and development grants, DIP(2) represents capital assistance grants, and DIP(3) represents source establishment grants.

Source: Various federal government departments and agencies and their publications.

The programs listed under Table 6.1 illustrate the extensive range of available federal government support during the period 1969-73. An important observation is the fact that, although assistance is generally limited to 50 per cent of the cost of a project, several of the programs could be used conjointly. A successful PAIT applicant, for example, would be required to share project costs equally with the federal government, but the firm could also have been successful in applying for an IRDIA grant of up to 25 per cent of its portion of the PAIT funding, thus resulting in grants equal to 62.5 per cent of the total project costs. Other programs might also have applied to the same project, or to the resultant product.

Table 6.2 presents a summary of estimated federal government support in the form of grants, loans and other types of assistance incurred during the four fiscal years 1969-70 to 1972-73 in support of the computer hardware industry. In some instances, it was readily apparent that the amounts of support were pertinent because the projects or products with which they were identified were well within the scope of the Reference. In other instances, however, it was difficult to determine whether the support clearly concerned the products of this industry. Many firms within the industry are also involved with non-computer products, and certain computer-like products are of marginal concern to the Reference. Pure research programs, for example, may have wide application. In these circumstances, the Board has attempted in Table 6.2 to isolate the amounts of support that were considered pertinent, sometimes by prorating project support in relationship to a firm's degree of involvement with computing equipment. Some small amounts of assistance included in the table might have been directed more towards electronic products and parts generally than to computer hardware.

Table 6.2: Estimated Federal Government Industrial Development Program Assistance in Support of the Computer Hardware Industry in Canada, 1969-70 to 1972-73

Form of Aid	Program	1969-70	1970-71	1971-72	1972-73	Total 1969-70 to 1972-73
			-	$'000	-	
Grants						
	DIP(1)(a)	267.0	298.3	283.8	246.2	1,095.3
	DIP(2)	453.3	315.8	225.0	1,038.4	2,032.5
	DIP(3)	93.0	610.4	570.3	815.8	2,089.5
	IDAP	-	-	17.5	19.0	36.5
	IRDIA(b)	2,910.2	3,414.9	3,966.7	4,676.1	14,967.9
	PAIT	197.5	2,671.5	6,949.5	4,647.7	14,466.2
	PEP	-	-	-	5.0	5.0
	GAAP	-	-	170.0	13.0	183.0
	PPP	-	57.8	90.0	-	147.8
	CMITP(c)	368.3	468.6	1,596.1	1,287.4	3,720.4
	RDIA	138.9	-	1,779.1	102.0	2,020.0
	DIRP	502.9	685.1	726.6	473.0	2,387.6
	IRAP	340.9	571.5	420.8	663.4	1,996.6
Total		5,272.0	9,093.9	16,795.4	13,987.0	45,148.3
Insured Loans						
	GAAP	-	7,836.0	8,073.0	10,400.0	26,309.0
Interest-Free Repayable Advances						
	PEMD	-	-	60.4	5.2	65.6
	DIP(2)	453.3	315.8	225.0	1,038.4	2,032.5
Total		453.3	315.8	285.4	1,043.6	2,098.1
Export Insurance(d)						
	Export Development	-	-	21,000.0	-	21,000.0

(a) DIP(1), (2) and (3) refer to the programs in Table 6.1, viz. R & D, capital assistance and source establishment, respectively.
(b) IRDIA figures for 1969-70 and 1970-71 estimated by IT&C; later years represent projections by the Tariff Board.
(c) CMITP figures represent amounts contracted for and not necessarily paid in the years indicated.
(d) The Export Insurance figure represents the value of goods insured, and refers to the 1972 calendar year; related exports occurred in this and subsequent years.

Source: Various federal government departments and agencies and their publications.

Table 6.2 reveals that grants, collectively, were the most significant form of federal government support for the industry, and amounted to $45.1 million over the four fiscal years 1969-70 to 1972-73. The DIP, IRDIA and PAIT programs, administered by the Department of Industry, Trade and Commerce, account for the bulk of the grants, although significant amounts are to be found also under the CMITP, RDIA, DIRP and IRAP programs. The grants provided under PEP, GAAP and PPP have been sporadic and relatively small. In addition to grants, the federal government, under GAAP, insured loans totalling $26.3 million, and provided interest-free repayable advances to the industry, largely under DIP, amounting to $2.1 million.

In 1972-73, the grants received by this industry amounted to $14.0 million. In 1972, according to responses to Tariff Board questionnaires, the computer hardware industry produced goods valued, at plant, at $206.4 million. Grants accounted, therefore, for 6.8 per cent of the value of all goods produced by the industry. From another viewpoint, the grants partially offset the costs of production of Canadian computer hardware manufacturers; a cost-offsetting impact which the Board has calculated to be the equivalent of a 7.2 per cent rate of duty. If this figure is compared with the average rate of duty paid, after duty remissions, on all imported computing equipment of 8.9 per cent for imports during the period covered by the Board's import analysis,(1) it appears that grants are almost as valuable as an incentive to production in Canada as is the tariff.

The grants by the federal government to firms producing computer hardware have been largely directed toward research and development, with $4.4 million for pure research, and $30.6 million for research and development generally. The total of $35 million for research and development was 77 per cent of total grants during the period 1969-70 to 1972-73. Industrial training assistance accounted for grants of $3.7 million, followed by $2.2 million for export market development. Grants separately amounting to $2.0 million were for the purposes of direct job creation and the improvement of producers' productive capability during the four-year period. Loan insurance, to cover an amount of $26.3 million, was exclusively for producer and industry restructuring under the GAAP. Interest-free repayable advances were largely for the purpose of enhancing the productive capability of the recipients. Insurance was provided for $21 million of computer hardware exports, the sale of which commenced during the period.

The computer hardware industry received a substantial share of federal government assistance under the various programs reviewed in this chapter. The $45.1 million in grants received during 1969-70 to 1972-73 accounted for 5.6 per cent of the estimated $798.9 million in grants provided to all industries under these programs during the same period. And if the RDIA program, which, because it is limited to the peripheral economic regions of Canada, did not have a high degree of applicability to the urban-centred computer hardware industry, is excluded, then this industry received some 9 per cent of all grants under the remaining programs. Moreover, the industry was the recipient of 37 per cent of all loan insurance, and of some 6 per cent of all interest-free repayable advances.

(1) See Chapter III, p. 94.

The computer hardware industry appears to have received, on average, more financial assistance relative to its value of production or employment than other industries. Its shares of total manufacturing output and employment in 1972, 0.4 per cent and 1.2 per cent respectively, are substantially less than its share of the total amount of financial assistance provided under the cited federal government programs. The Board is unaware of the amounts of assistance received by other particular industries, and is therefore unable to state whether any other industry has received more assistance than the computer hardware industry, in absolute or relative terms. However, for this industry to have received almost 6 per cent of the grants under these industrial development programs, suggests that it has been well favoured, relative to most other industries in terms of federal government support.

Provincial Government Support

Although the Board has not studied the support provided to the computer hardware industry by provincial governments, it is understood that they provide assistance in a fashion similar to that of the federal government, viz., through general industrial development programs not necessarily aimed at particular industries. During the course of this Reference, the Board has learned of two or three examples of assistance to firms within the industry provided by the Governments of Ontario and Quebec. Although these are isolated examples, the paucity of evidence would tend to confirm the general impression that the bulk of the financial assistance which the computer hardware industry has obtained, has been provided by the federal government.

Federal Government Procurement

Government procurement of goods and services can be an important instrument in shaping industrial development. Certain European governments, for example, have given preference to their domestic computer industries by supporting them in the face of strong market pressures from multinational enterprises. In Canada, the federal government has acknowledged the importance of procurement as an instrument of selective stimulation of the Canadian computer industry in statements numbered 19 and 20 in the green paper.[1]

Procurement of computer goods and services in the federal government is the responsibility of the Department of Supply and Services, in conjunction with the requisitioning department, and under policy guidelines established by the Treasury Board. The objectives of computer goods and services procurement have been stated within the context of a federal government EDP policy framework. The more detailed objectives of EDP policy are:

> To provide an environment for equipment, personnel and supporting services that will optimize the contribution of EDP to government in total, while recognizing the respective roles of departments and central agencies.

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(1) Computer/Communications Policy - A Position Statement by the Government of Canada, Department of Communications, Ottawa, April 1973.

> To allow acquisition of equipment and services of an optimum quality with timely delivery and least cost, and consistent with any national industrial strategy established for Canada.(1)

Thus, although in general the aim of government procurement has been to purchase equipment and services which will best perform required tasks at the least cost, there is provision for a national industrial strategy within procurement policy.

Government procurement policies and practices can be a significant source of indirect financial assistance. Current federal government practices provide for a 10 per cent preference for Canadian content,(2) i.e., the value of Canadian content is discounted by 10 per cent when tendered bids are compared. In effect, this permits the Canadian content of the computing equipment in question to be compared with foreign content, even though the former may cost 10 per cent more to produce. This credit is equivalent to a 10 per cent rate of tariff protection, and applies equally to Canadian content of computing equipment assembled in Canada from imported parts, and to computing equipment assembled abroad from Canadian-made parts.

The second procurement practice of providing recognition to the contribution of total manufacturing in Canada by the firms tendering to supply the federal government with computing equipment provides such firms with advantages over suppliers without Canadian manufacturing facilities. This recognition inevitably transforms itself equally into an "allowance" for Canadian content, and also constitutes, therefore, a manner of providing assistance to offset the higher costs of producing in Canada.

As far as the impact of federal government procurement of computers and related telecommunications equipment and services is concerned, some idea of the magnitude can be gained from the expenditures processed by the Department of Supply and Services: in the 1973-74 fiscal year, these amounted to $53 million in total, of which $37 million was estimated to be for hardware. These expenditures, however, do not cover the purchases of some federal government agencies, nor those of certain federal Crown Corporations. In addition, there is the procurement of provincial governments, their Crown agencies, and of municipalities. Although the Board was unable to obtain information concerning the expenditures on computer hardware by these levels of government, it is also believed to be substantial. The Canadian Computer/Communications Task Force estimated that 35.5 per cent of the value of installed computer systems in Canada in 1971 was accounted for by the public sector, including all levels of government, hospitals, educational and other institutions.(3) There is no reason to believe that the public sector share has diminished since that time, and it represents, therefore, a very significant market for the industry.

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(1) Treasury Board, Guide on EDP Administration for Departments and Agencies of the Government of Canada, Ottawa, 1974, p. 13.

(2) Derived from a statement by the Hon. James Richardson, Minister of Supply and Services, Minutes of Proceedings and Evidence of the Standing Committee on Miscellaneous Estimates, House of Commons, 27:11, May 13, 1971.

(3) Branching Out, Report of the Canadian Computer/Communications Task Force, Department of Communications, Ottawa, May 1972, p. 49.

Other Measures

In addition to the specific industrial development and industrial training programs outlined in Table 6.1, and to government procurement policies, there are two other measures by which the federal government provides assistance to the computer hardware industry: the drawback provisions of the Customs Act; and the Program for the Remission of Duties Under Tariff Item 42700-1.

The drawback of duties paid is provided for under sections 275 to 277 of the Customs Act, and relates to the reimbursement of duties paid on manufacturing materials and parts imported for incorporation into finished products that are subsequently exported. The drawback prevents these duties from becoming a disadvantage for Canadian manufacturers in export markets, or, from a different viewpoint, it implies that foreign producers of computing equipment will not be able to derive a price advantage in external markets because of access to lower-priced parts. The tariff on parts, an element in the cost of manufacturing or assembling computing equipment for the Canadian market, is eliminated as a cost factor when producing for export. The drawback of duties, however, negates the protection provided to domestic parts producers.

The drawback provisions of the Customs Act are very significant to the export-oriented computer hardware industry. As discussed in Chapter IV, this industry exports 87 per cent of its output, with the result that 87 per cent of the duties paid can be drawn back if the industry imports all of its materials and parts. The Board was able to calculate, on the basis of information supplied in its industry survey, that the amount of duty eligible to be drawn back in 1971-72 was $12.6 million. On the assumption that the ratio of duty drawn back to the total value of imported materials and parts in that year was the same for 1969-70, 1970-71, and 1972-73, then the drawback of duties is calculated at $6.6, $10.3, and $10.0 million, respectively, for a four-year total of $39.5 million.

Remission of duties is provided for under the Machinery Program (MACH) of the Department of Industry, Trade and Commerce. Machines and parts thereof imported under tariff item 42700-1 are eligible for duty remission when they are not available from production in Canada, and when it is in the public interest.(1) Remission of duties under this program, in so far as computing equipment is concerned, has been granted mostly on imports of peripheral equipment and parts. It would appear that the remission of duties on finished products not made in Canada is of no direct assistance to Canadian hardware manufacturers; it is of assistance to suppliers of finished products in Canada inasmuch as it reduces the price of the imported equipment to the user, and may therefore increase sales beyond the level that would have existed in the absence of the remission of duties.

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(1) For a more complete discussion of the Machinery Program, see Chapter III, pp. 103-106.

Where the remission of duties on parts imported for assembly in Canada is concerned, the Machinery Program is of direct assistance in two ways. First, it effectively permits parts not available in Canada, which are destined for assembly into finished products for the domestic market, and which are otherwise dutiable, to enter free of duty. The Machinery Program, therefore, can provide the same benefits with respect to production for the domestic market as the drawback provisions furnish with respect to production for export markets. Secondly, it effectively permits parts not available in Canada, which are destined for assembly into finished products for the export market, which are otherwise dutiable, and which would be eligible for duty drawback, to enter free of duty without incurring the high administrative and financial costs associated with obtaining the drawback of duties. As explained in Chapter III, the remission of duties can be granted prior to importation, thus avoiding the actual payment of duties, whereas under the drawback provisions, the duties must first be paid, and are reimbursed to the extent of 99 per cent of the duty paid upon proof of export.

The Board has estimated that the total amount of duties and sales taxes remitted on computing equipment and parts for the four years 1970-73 was \$42.9 million.(1) The amount of duties remitted on parts alone, however, could not be determined, but, on the basis of the Board's analysis of imports during November and December 1971, it is believed to account for a substantial proportion of total duties remitted. During the survey period, duties remitted on parts amounted to \$555 thousand, or 28 per cent of total duties remitted.

The effect of all the financial assistance provided by the federal government to the computer hardware industry has been to reduce its costs of production in Canada by a substantial margin. On the basis of gross production valued at \$206.4 million in 1972, the estimated \$14 million of grants in 1972-73 and drawbacks of \$10 million in 1972-73 would together account for 11.6 per cent of the value of production. This magnitude of financial assistance is approximately equivalent to the average protection provided by the tariff before remission of duties and provides, therefore, an allowance for the higher costs of producing computing equipment in Canada.

SUMMARY

The federal government has deemed the whole field of computer communications sufficiently important to have issued a green paper on the subject. The broad position statements contained therein encompass industrial development policies, which are those of prime interest to this Reference. These policy statements emphasize the need for selective stimulation of the Canadian computer industry, through supportive rather than protective measures, and by means of the federal government's industrial, procurement and science policies. A mechanism has been established to coordinate the viewpoints of the many federal government departments involved in policies and programs affecting computer communications, and to take cognizance of provincial government and industrial views concerning this complex and dynamic field.

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(1) See also Chapter III, p. 106.

No concerted attempt has been made by the Board to determine the respective positions of provincial governments towards the computer hardware industry. It is known that they have interests in certain aspects of computer communications, and some have given support to a few firms within the industry. This has tended to be overshadowed by the amounts and variety of assistance provided by the federal government.

An examination of the federal government's industrial development programs during the period 1969-70 to 1972-73 reveals that firms within the computer hardware industry received some $45.1 million in grants, insurance of loans totalling $26.3 million, interest-free repayable advances amounting to $2.1 million, and insurance of exports worth $21 million. Drawback of duties under the drawback provisions of the Customs Act amounted to an estimated $39.5 million. In addition, the remission of duties on parts under the Machinery Program, and government procurement practice provided further further assistance to the computer hardware industry.

Such amounts of assistance appear to have favoured the computer industry during the 1969-73 period. It is doubtful, however, that this was the result of a deliberate effort to support the computer hardware industry per se: more probably, the firms and products involved lent themselves to being appropriate vehicles for support within the general industrial development framework. Nevertheless, the amounts of assistance granted appear to be significant.

CHAPTER VII: INTERNATIONAL TRADE

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CHAPTER VII: INTERNATIONAL TRADE

This chapter examines the nature of international trade in computer hardware, with particular emphasis upon Canada's imports and exports. It reviews the magnitude and direction of Canada's trade in computing equipment in recent years in total by types of equipment, by import sources and by export destinations. It discusses Canada's balance of trade in computing equipment and contrasts this with the balances of trade pertaining to certain other Canadian industries. Attention is then focused upon the trade of other selected countries, in order to place Canada's trade in computing equipment within a wider perspective. The trade balances with respect to computer hardware for each of the selected countries are reviewed and Canada's balance of trade is examined within this context.

CANADIAN TRADE IN COMPUTING EQUIPMENT

Canadian Imports

Statistics relating to Canadian imports of computing equipment have been derived from the Board's survey of imports for two months in 1971, and from import statistics published by Statistics Canada by commodity class. The Board examined data for the two-month survey period on imports by type of equipment, by country of origin, by product group by country of origin, and by related and non-related companies. In order to protect confidential information, details of the Board's findings, in many cases, cannot be given.

The survey figures have been used to ascertain the proportion of relevant equipment contained within each of the pertinent commodity classes.(1) The estimated value of total Canadian imports of computing equipment and parts by commodity class for the years 1966 to 1974 are shown in Table 7.1. The estimated values, because of the probability of fluctuating proportions of relevant equipment within commodity classes over time, are best regarded as adequate indicators of trends, rather than of absolute values. As noted in Chapter IV, the value of imports of finished products is a good indicator of growth in the domestic market for computing equipment, because imported equipment supplies almost all of the Canadian market.

Imports of computing equipment rose from $113.4 million in 1966, to $421.3 million in 1974, or at an annual average growth rate of 17.8 per cent. Over the period 1971-1974 the rate of growth in imports moderated significantly to an annual average of 14.3 per cent, but still an impressive rate of growth. The dominant commodity class, 771-22,(2) which accounted for over 75 per cent of total computing equipment imports in 1974, had an annual average rate of growth from 1966 to 1974 of 17.2 per cent. Only class 771-20,(3) which accounted for some 17 per cent of total computing equipment imports in 1974,

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(1) A note on the identification of pertinent commodity classes, and the statistical method used to derive estimates of computing equipment imports is contained in Appendix D.

(2) 771-22: Electronic computers and parts.

(3) 771-20: Card punching, sorting and tabulating machines and parts.

had a rate of growth higher than the total average: 25.9 versus 17.8 per cent. From a relatively low base in 1966, imports under this commodity class reached a peak of $108.1 million in 1972, fluctuating somewhat below that level after that year. The remaining relevant commodity classes all exhibited lower rates of growth than the annual average for total computing equipment imports over the 1966-74 period.

Canadian Imports by Type of Equipment

Where particular types of equipment are concerned, the Board considers that the limitations of the import survey period are such that any product-by-product ratios are unlikely to be meaningful. Consequently, the Board has estimated the probable composition of imports over the years 1971-1974 by the main product groups only. These estimates, derived on the basis of products and parts imported by commodity class during the survey period, are shown in Table 7.2. Variations in the value of imports by commodity class in the years indicated explain the year-to-year changes in the estimated value of imports by product group.

On the assumption that the relationship between product groups and commodity classes is reasonably constant, then the estimated import values shown in Table 7.2 give rise to the following average annual rates of growth for 1971-1974: mainframes, 21.8 per cent; peripherals, 16.5 per cent; related telecommunications equipment, 22.2 per cent; parts, 5.1 per cent; and for total imports, as indicated previously, 14.3 per cent. If parts, with their low rate of growth, are excluded, the average annual growth rate for finished products alone is 18.3 per cent over the same period, or some 4 per cent greater than the average annual growth rate for total imports.

This strongly suggests, first, that the imports of finished products have not moderated their rates of growth as significantly as at first indicated by the differences in the rates of growth of total imports for 1966-1974 and 1971-1974 and second, that the imports of parts, and hence the volume and value of production in Canada, have not maintained pace with the export potential for finished goods. In other words, given the commitment to rationalize production in Canada, it appears that for 1971-1974 the export markets for computing equipment in Canada have grown at significantly higher rates than has the value of Canadian production of this equipment. The bulk of parts for assembly into finished products is provided by imports.

Table 7.1: Estimated Canadian Imports of Computer Hardware by Commodity Class, 1966 to 1974

Commodity Class No.	Commodity Class Description	1966	1967	1968	1969	1970	1971	1972	1973	1974	Average Annual Rate of Growth, 1966-1974
					-	$'million	-				%
702-90 [a]	Electrical and electronic properties measuring and testing instruments accessories and parts, n.e.s.	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.6	0.7	4.3
703-78 [b]	Process control and multi-function controlling machinery and apparatus	2.0 [c]	2.4 [c]	2.7 [c]	1.7	3.1	3.5	3.6	4.8	6.3	15.4
771-04	Accounting and bookkeeping machines and parts, n.e.s.	9.9	11.7	11.6	13.5	12.5	16.7	22.2	17.9	22.0	10.5
771-20	Card punching, sorting and tabulating machines and parts	11.6	10.5	12.3	17.3	41.3	85.6	108.1	59.7	73.5	25.9
771-22	Electronic computer and parts	89.5	110.9	103.9	153.6	168.7	176.3	203.3	264.9	318.8	17.2
	Total	113.4	136.1	131.1	186.7	226.2	282.5	337.6	348.0	421.3	17.8

(a) Prior to 1971 included class 702-41 "Signal generators and test oscillators". Prior to 1968 included in class 702-27 "Electricity measuring instruments".
(b) Prior to 1969 included in class 703-90.
(c) Estimated by the Board as being the amounts applying to class 703-78.

Source: Tariff Board; Statistics Canada.

Table 7.2: Estimated Canadian Imports of Computer Hardware by Product Group, 1971 to 1974

Product Group	1971		1972		1973		1974	
	$'mil.	%	$'mil.	%	$'mil.	%	$'mil.	%
Mainframes	56.2	19.9	64.9	19.2	84.5	24.3	101.7	24.1
Peripherals	129.0	45.7	153.7	45.5	168.6	48.4	204.2	48.5
Related telecommunications equipment	4.0	1.4	4.7	1.4	6.1	1.8	7.3	1.7
Parts	93.2	33.0	114.4	33.9	88.8	25.5	108.1	25.7
Total Imports	282.5	100.0	337.6	100.0	348.0	100.0	421.3	100.0

Source: Tariff Board; Statistics Canada.

Canadian Imports by Country of Origin

The value of imports into Canada of computing equipment by country of origin during the survey period is shown in Table 7.3. The United States was by far the leading source of computing equipment imports, accounting for almost $56 million or 86 per cent of total imports during the survey period. A relatively smaller amount was accounted for by the United Kingdom, $2.9 million or 4.5 per cent.

Table 7.3: Canadian Imports of Computer Hardware by Country of Origin, Value, Duty Paid and Remitted, Two Months, 1971

Country of Origin	Value of Imports	Country Share of Total	Duty Paid	Duty as % of Value	Remission	Duty as % of Value After Remission
	$	%	$	%	$	%
United Kingdom	2,910,685	4.5	66,555	2.3	34,354	1.1
West Germany	74,406	0.1	6,678	9.0	566	8.2
Netherlands	428,272	0.7	26,673	6.2	7,335	4.5
United States	55,969,326	85.8	6,991,821	12.5	1,855,564	9.2
Others	5,878,679	9.0	649,174	11.0	78,025	9.7
Total	65,261,368	100.0	7,740,901	11.9	1,975,844	8.8

Source: Tariff Board survey.

The average rates of duties paid have also been indicated in Table 7.3, both before and after duty remissions. Before duty remissions, the average rate of duty on all imports of computing equipment into Canada did not exceed 15 per cent for any exporting country. The average rate of duty on imports from the United Kingdom was the lowest because of the applicability of B.P. Tariff rates. Imports from the largest single source, the United States, were subject to an average rate of duty of 12.5 per cent. Duty remissions reduced the average rates of duty paid on imports from the United States from 12.5 to 9.2 per cent; and from the United Kingdom from 2.3 to 1.1 per cent. As noted in Chapter III, duty remissions reduced the average rate of duty paid on total imports from 12 per cent to 9 per cent.

In order to determine the source of imports over a longer period than that covered by the survey, it was necessary to rely on imports by commodity classes by country of origin. Three commodity classes, 771-20, 771-22 and 703-78, contain a very high content of computing equipment; it is virtually certain, therefore, that all the countries listed by Statistics Canada under these commodity classes were the sources of computing equipment imports. Although classes 771-04 and 702-90 were less applicable, the countries listed therein generally coincide with those of the more applicable classes; the Board believes, therefore, that the aggregation of the imports of the five commodity classes gives a reasonable indication of imports of computing equipment by country of origin. These are shown in Table 7.4 for the years 1971-1974.

The value of imports of computing equipment during 1971-1974 roughly coincides with that of the survey period in terms of countries of origin. The United States remained the dominant supplier, accounting for a very large and stable proportion of total Canadian imports, about 89 per cent on average, throughout the period. No other country provided more than 4.5 per cent of Canadian computing equipment imports, and the only other imports of significance were those from the United Kingdom, France, West Germany and Japan.

Given the close proximity of Canada to the United States, and the U.S. domination of the computing field, the question that arises is not the extent to which Canada appears dependent on imports from the United States, but how other countries appear to be able to provide something over 10 per cent of Canadian imports in the face of such strong U.S. advantages. It appears illogical, for example, that Argentina should be the source of a very small, but growing value of Canadian computing equipment imports. The reasons are undoubtedly connected to the rationalization and specialization of production which has taken place on an international scale within multinational enterprises.

It has been demonstrated in Chapter III that the B.P. tariff rates are significantly lower than M.F.N. rates for computing equipment, averaging 2.3 and 12.3 p.c. respectively before remissions, and 1.1 and 9.2 p.c. respectively after remissions, during the survey period. If the tariff were regarded as a significant barrier, then one might expect that the multinational computer companies would make every effort to obtain their Canadian imports from such B.P. tariff countries as the United Kingdom, Ireland, Australia, and South Africa. The

Table 7.4: Estimated Canadian Imports of Computer Hardware by Country of Origin, 1971 to 1974

Country of Origin	1971		1972		1973		1974	
	$'000	%	$'000	%	$'000	%	$'000	%
United Kingdom	8,327	2.9	8,432	2.5	15,531	4.5	16,430	3.9
Ireland	-	-	351	0.1	965	0.3	355	0.1
Austria	87	*	169	0.1	3	*	32	*
Belgium and Luxembourg	164	0.1	1,388	0.4	1,150	0.3	1,018	0.2
France	9,298	3.3	3,644	1.1	9,167	2.6	11,567	2.7
West Germany	1,139	0.4	1,376	0.4	3,108	0.9	7,632	1.8
Italy	2,004	0.7	1,056	0.3	1,740	0.5	1,344	0.3
Netherlands	1,444	0.5	1,986	0.6	960	0.3	807	0.2
Sweden	329	0.1	742	0.2	705	0.2	514	0.1
Switzerland	310	0.1	324	0.1	211	0.1	131	*
Israel	124	*	98	*	185	*	237	0.1
Japan	6,952	2.5	6,593	2.0	4,201	1.2	4,563	1.1
Argentina	1,128	0.4	1,801	0.5	1,928	0.6	2,625	0.6
Brazil	-	-	56	*	94	*	788	0.2
United States	250,886	88.8	309,136	91.6	307,857	88.5	372,559	88.4
Others	273	0.1	454	0.1	174	*	664	0.2
Total Imports	282,465	100.0	337,606	100.0	347,979	100.0	421,266	100.0

Source: Tariff Board; Statistics Canada.

United Kingdom particularly, has a well-developed computer hardware industry with manufacturing facilities belonging to such companies as IBM, Honeywell Information Systems, Burroughs and NCR, as well as British companies. The fact that these companies have not taken advantage of lower B.P. tariffs on any appreciable scale suggests that tariffs on computing equipment are relatively unimportant, and that other factors, such as the international rationalization of production are more significant.

Canadian imports of computing equipment by product group and by country of origin were obtained for a two-month period in 1971; however, details cannot be given because of the possibility of revealing confidential data. The United States was the major source of imports for each product group. Other important sources were France and Japan for mainframes and the United Kingdom for peripherals.

Canadian Imports by Related and Non-Related Companies

A high proportion of Canadian imports of computing equipment is attributable to transactions between companies having corporate affiliations than between non-related companies. During the survey period, foreign companies related to the Canadian importing companies provided 91.5 per cent of the total value of computing equipment imports. This very high proportion is not surprising in view of the dominance of the Canadian computing equipment market by the products of the multinationals. This 91.5 per cent share of imports could well be indicative of the usual share of the Canadian computing equipment market held by the multinationals. The remaining 8.5 per cent share of imports represents the transactions between the smaller foreign companies and their Canadian distributors, plus a small volume of direct imports by a very small number of users, such as universities and research establishments.

The breakdown of imports by groups of exporting countries indicates that the related companies in each of the groups accounted for over 90 per cent of computing equipment imports. On the basis of the survey data, the probability is high that, with the exception of imports from the United States, virtually all computing equipment imports into Canada from other sources are the result of transactions between related companies. Where imports from the United States are concerned, the transactions between non-related companies are the largest of any of the groups of exporting countries at 9.2 per cent. This is indicative of the relative strength of smaller U.S. companies which do not possess production or marketing facilities in Canada but which regard Canada as an extension of their own market.

The ratios of the values of imports of finished products to parts between related companies on the one hand, and between non-related companies on the other hand, reveal a somewhat greater proportion of parts in the import mix of the related companies. Finished products from all countries accounted for some 63 per cent of related company imports, whereas the equivalent figure for non-related company imports of finished products was 72 per cent. The total value of parts imported by related companies exceeded greatly that imported by non-related companies. This is additional evidence of the fact that the largest proportion of manufacturing or assembling of computing equipment in Canada is undertaken by the subsidiaries of foreign-owned companies.

Canadian Exports

Information concerning Canadian exports of computing equipment has been derived largely from data published by Statistics Canada, and from supplementary data contained in responses by industry to Tariff Board questionnaires. As far as can be determined, and in contrast to imports, a single commodity class encompasses the products and parts under review: class 771-21, card punching, sorting and tabulating machines, electronic computers and parts. Because of definitional difficulties, some small amounts of equipment and parts may have been included under other export commodity classes; at the same time certain items may be included in class 771-21 that the Board would consider as being extraneous. On balance, the Board believes that the values included under class 771-21 represent a reliable indication of Canada's exports of computer hardware.

Canadian computer hardware exports by value and by year from 1966 to 1974 are shown in Table 7.5. From a low base in 1966 of $36.5 million, total exports increased to $196.6 million in 1974, or at an average annual growth rate over the period of 23.4 per cent. More recently, however, over 1971-74, the average annual growth rate declined to 9.1 per cent. These are in contrast to the average annual growth rates for imports over the same periods of 17.8 per cent, and 14.3 per cent respectively. The high average annual growth rate in exports over the 1966-1974 period is partially attributable to the low value recorded in the base year of 1966.

Table 7.5: Canadian Exports of Computer Hardware by Year, 1966 to 1974

Year	Total Value	Value of Re-Exports Included	Share of Re-Exports of Total
	- $'million	-	%
1966	36.5	3.5	9.59
1967	50.6	5.7	11.26
1968	50.0	8.6	17.20
1969	73.5	14.8	20.14
1970	112.2	15.0	13.37
1971	151.5	18.4	12.15
1972	186.0	25.6	13.76
1973	168.1	33.6	19.99
1974	196.6	53.7	27.31

Source: Statistics Canada.

Export performance during the 1966-1974 period may be even more questionable when the values of re-exports are taken into account. As shown in Table 7.5, the values of re-exports have increased progressively from year to year, from $3.5 million in 1966, or some 10 per cent of total exports, to $53.7 million in 1974, or over 27 per cent of total exports. Re-exports, according to

information given to the Board, consists of three types of computer hardware: first, those computer systems or units of equipment that have been imported and installed in Canada, and whose lease has expired and for which there remains no market demand in Canada; and second, those mainframes and other computing devices imported for use by OEMs in such exported products as aircraft flight simulators; and third, those units of computing equipment, usually stand-alone peripheral devices, that have been returned to Canada for refurbishing and subsequent re-export. If re-exports are deducted from total exports, then the average annual rate of growth of exports over 1666-1974 declines from 23.4 per cent to 20.1 per cent. For 1971-1974, the decline is from 9.1 to 2.4 per cent. As an additional factor, the inclusion of re-exports of such magnitude makes it difficult to arrive at a truly realistic measure of the Canadian market because of probable differences between import and export values.

In order to determine the export orientation of the industry, the Board compared 1972 export values to production values in that year. As estimated from the Board's survey of the industry, exports in 1972 amounted to $143.3 million, production amounted to $165.1 million, giving an export factor of production of 87 per cent. Foreign-owned firms accounted for production of $152.8 million, and exports of $136.2 million, or 89 per cent of production. Canadian-owned firms accounted for production of $12.3 million, and exports of $7.1 million, or almost 58 per cent of production. These figures substantiate the high degree of export orientation attributed to the industry.

Canadian Exports by Product Group

The breakdown of Canadian computing equipment exports by product group has been derived from responses by industry to the Tariff Board survey. The data relate to 1972, and have been apportioned to the published net export total of $160.4 million.

On the basis of the composition of equipment exported in 1972, mainframes accounted for $1.6 million, or about 1 per cent of total exports. These consisted largely of small, special-purpose mainframes. Peripherals at a value of $133.4 million, or 83 per cent, constituted by far the largest proportion of exports, and consisted mainly of data preparation and data entry equipment. Related telecommunications equipment accounted for a very small proportion of total exports, less than 1 per cent, and consisted entirely of modems. Parts, components and subassemblies constituted the balance of exports in 1972, accounting for $25.3 million, or about 16 per cent of total exports. It is believed that parts exports consisted chiefly of subassemblies for integration into units of equipment at foreign plants.

Although the figures relating to exports by product group are not as precise as the Board would have preferred, it is clear that, in 1972 at least, Canada's exports were centered upon stand-alone peripheral equipment which is used in support of data processing installations. The products exported were also a reflection of the products manufactured at that time. By the end of 1972, however, plans were being undertaken or implemented that would have a substantial impact on the types of products being manufactured in Canada, and which would also affect the product mix of future exports. As a result of the

changes that were beginning to develop, the exports of 1972 by product group were probably not representative of later years; it would, therefore, be misleading to suggest that the same breakdown applies to exports either before or since that year. It is probable that, from 1973, exports of peripherals and parts have declined relatively, while mainframes and related telecommunications equipment have slightly increased their shares of the total value of exports.

Canadian Exports by Importing Country

The value of Canadian exports of computing equipment and parts by importing country are shown in Table 7.6 for the years 1971 to 1974.

It is evident that the countries which are the recipients of most of Canada's exports of computing equipment, are usually the same countries which provide most of Canada's imports of these goods. The United States has been the main destination, but with a fluctuating share of total Canadian exports. From a low share in 1966 of 44 per cent, its share increased progressively, until in 1972 it attained 88 per cent; thereafter, it declined to 71 per cent in 1973, and to 59 per cent in 1974. The United States consistent share of Canadian imports of computing equipment has not been matched, therefore, by an equally consistent share of Canadian exports.

In terms of other destinations, the United Kingdom received the second largest value of Canada's 1974 exports, followed by France, Italy, and West Germany. These countries were the main recipients of Canadian exports after the United States during the 1971-1974 period. Exports to Japan and Australia grew substantially during the same period to account for 3.3 and 3.1 per cent of total exports respectively. No other single country accounted for more than 3 per cent of Canada's exports in 1974, and in that year there were a total of 22 countries which imported more than $0.5 million of Canadian computing equipment exports. All other export destinations combined, accounted for 4.0 per cent of Canadian exports. Surprisingly, there were a total of 88 countries which received exports of computing equipment from Canada in 1974. By contrast, 33 countries provided imports to Canada in the same year.

It might have been expected that the reason for such a large number of export destinations would have been due to re-exports. In other words, given the types of products which comprise re-exports, that many of the 88 countries would be solely or mostly importing reworked and obsolescent equipment. This is apparently not the situation, for the Board has examined several years' exports, and the instances where re-exports outweigh exports to any one country are relatively few. The instances where re-exports from Canada constitute the totality of imports of any one receiving country are extremely rare. It is likely, therefore, that a very large proportion of Canadian computing equipment exports, probably in the order of 90 per cent or more, is the result of transactions between affiliated companies in Canada and abroad. There are at least two reasons to support this view: first, the information provided to the Board for 1972 shows that the bulk of the production and exports for that year was undertaken by the subsidiaries of the large, multinational computer companies, and it is the normal trading pattern of these companies either to transfer

Table 7.6: Canadian Exports[(a)] of Computer Hardware by Importing Country, 1971 to 1974

Importing Country	1971		1972		1973		1974	
	$'000	%	$'000	%	$'000	%	$'000	%
United Kingdom	7,423	4.90	9,674	5.20	11,442	6.81	12,469	6.34
Ireland	29	0.02	96	0.05	502	0.30	824	0.42
Belgium and Luxembourg	296	0.20	70	0.04	492	0.29	1,019	0.52
Denmark	33	0.02	38	0.02	1,295	0.77	1,133	0.58
France	2,882	1.90	2,393	1.29	5,021	2.99	9,440	4.80
West Germany	1,768	1.17	2,384	1.28	7,051	4.19	6,705	3.41
Italy	1,880	1.24	1,184	0.64	3,616	2.15	7,667	3.90
Netherlands	941	0.62	1,220	0.66	2,485	1.48	2,800	1.42
Spain	372	0.25	156	0.08	967	0.58	1,321	0.67
Sweden	528	0.35	114	0.06	891	0.53	699	0.36
Switzerland	242	0.16	234	0.13	1,400	0.83	1,930	0.98
Yugoslavia	53	0.03	-	-	136	0.08	1,036	0.53
Iran	-	-	3	*	153	0.09	576	0.29
South Africa	3,182	2.10	671	0.36	776	0.46	1,120	0.57
India	161	0.11	153	0.08	364	0.22	721	0.37
Japan	879	0.58	1,488	0.80	1,546	0.92	6,505	3.31
Australia	468	0.31	568	0.31	3,592	2.14	6,056	3.08
Argentina	41	0.03	47	0.03	33	0.02	830	0.42
Brazil	1,033	0.68	656	0.35	1,381	0.82	4,197	2.14
Venezuela	1,197	0.79	148	0.08	683	0.41	749	0.38
Mexico	222	0.15	28	0.02	1,010	0.60	4,180	2.13
United States	126,447	83.47	163,357	87.82	119,113	70.85	116,652	59.34
Others	1,410	0.93	1,340	0.72	4,171	2.48	7,951	4.04
Total	151,487	100.0	186,022	100.0	168,120	100.0	196,580	100.0
Re-exports	18,412	12.15	25,581	13.75	33,606	19.99	53,726	27.33

(a) Exports include re-exports.

Source: Statistics Canada.

goods among affiliates, or, where very small markets are concerned, to sell directly to an agent; second, it is extremely unlikely that any Canadian-owned company could foster and sustain foreign markets to the extent that is suggested by the 88 destinations.

There seems little doubt that a very large proportion of Canadian computing equipment exports is sustained and controlled by the multinational computer companies. In conjunction with the evidence relating to imports, it must be concluded that Canada's trade in this equipment is very largely the preserve of these companies.

All of the Canadian subsidiaries of the large, multinational computer companies are wholly or partially committed to rationalized production, which, by definition, implies an export orientation. Even the independent Canadian manufacturers, without the advantages of foreign plants, rationalized production and foreign marketing networks as a group have exported a substantial proportion of their combined sales volume. It is also evident that Canadian manufactured computer products meet the international standards required of them, as exports to 88 countries attest. At the same time, it must be acknowledged that the bulk of the trade rests with the Canadian subsidiaries of the foreign-owned multinational computer companies, and that the volume of Canadian exports attained depends largely on their efforts.

The Canadian Balance of Trade

Canadian trade in computing equipment in the years 1966 to 1974 has resulted in annual visible imbalances that have grown from about $77 million in 1966, to about $225 million in 1974. The cumulative deficit for the period amounted to $1,158 million, the equivalent of an average annual deficit of $128.7 million. These figures are shown in Table 7.7.

Table 7.7: Canadian Visible Balance of Trade in Computer Hardware by Year, 1966 to 1974

Year	Value of Imports	Value of Exports (a)	Visible Trade Balance
	- $'million -		
1966	113.4	36.5	- 76.9
1967	136.1	50.6	- 85.5
1968	131.1	50.0	- 81.1
1969	186.7	73.5	-113.2
1970	226.2	112.2	-114.0
1971	282.5	151.5	-131.0
1972	337.6	186.0	-151.6
1973	348.0	168.1	-179.9
1974	421.3	196.6	-224.7
9-year cumulative deficit			-1,157.9
Annual average deficit			- 128.7

(a) Includes re-exports

Source: Tables 7.1 and 7.5.

Although exports have grown at a faster rate than imports over the period in question, the differential in the rates of growth has not been sufficient to prevent the visible trade imbalance from widening. From 1966, when export values were equal to 32 per cent of import values, until 1972, when the equivalent figure was 55 per cent of import values, exports grew at a faster rate than imports. Thereafter, exports declined relative to imports, and in 1974, export values were equal to only 47 per cent of import values. Whether the relative decline in exports from 1973 is indicative of a future trend is open to speculation. The changes noted previously that were taking place with respect to the production of new types and models of equipment in 1973 and 1974 may have had a noticeable effect on exports in those years.

In order to place this imbalance of trade in computing equipment within a wider perspective, but still within a Canadian context, the Board examined certain other Canadian trade balances to determine how the computing equipment imbalance fared by comparison. The visible trade balances for computing equipment, for all manufacturing, and for certain industries related to or having characteristics similar to the computer hardware industry, for 1966-1974, are shown in Table 7.8.

Table 7.8: Canadian Visible Balances of Trade in Computer Hardware, All Manufacturing, and Selected Industries, 1966 to 1974

Year	Computer Hardware	All Manufacturing	Office and Store Machinery	Electrical Products	Radio and TV	Communications Equipment
			- $'million -			
1966	- 76.9	-1,517.4	-144.0	- 375.9	- 26.8	-132.7
1967	- 85.5	-1,485.8	-162.9	- 403.7	- 39.2	-120.5
1968	- 81.1	- 998.8	-159.4	- 303.9	- 53.2	- 37.2
1969	-113.2	-1,237.3	-208.5	- 452.2	- 85.2	- 76.3
1970	-114.0	+ 82.2	-214.8	- 375.8	- 87.1	- 56.0
1971	-131.0	- 867.5	-234.8	- 563.2	-116.7	-114.8
1972	-151.6	-1,906.4	-279.3	- 806.1	-296.5	-207.0
1973	-179.9	-2,557.8	-312.4	- 984.4	-233.0	-261.6
1974	-224.7	-5,683.0	-415.2	-1,230.6	-276.0	-306.3
Average Annual Deficit	-128.7	-1,796.9	-236.8	-610.6	-134.9	-145.8

Source: Trade by Industrial Sector, Policy Analysis Branch, Department of Industry, Trade and Commerce.

It is apparent that trade imbalances are present in each of the selected industries, and, with the exception of 1970, in all manufacturing industries combined. The trade deficit in computer hardware, therefore, is not unique; it moves in the same direction as the selected industries. It bears a very constant relationship to the deficit incurred in office and store machinery, which, as will be seen in Chapter VIII, encompasses a number of Canadian computer hardware manufacturers, and accounts for a large portion of computer hardware production. The computer hardware imbalance of trade is growing at a slightly less rapid rate than that of electrical products, and it is only in the last three years of the review period that the trade imbalances of radio and television, and communications equipment have exceeded that for computer hardware.

The rapid increase in the imbalance of trade for all manufacturing industries combined from 1972 onwards is a reflection of what has transpired generally within manufacturing. In this respect, the rate of increase in the imbalance of trade in computer hardware from 1972 onwards, is far lower than the average for all manufacturing. It may be inferred, therefore, that although the imbalance of trade in the computer hardware industry has grown significantly in recent years, its trade performance has been relatively stronger than that of most other manufacturing industries during the same period.

The discussion thus far has related solely to "visible" trade balances; that is, the differences in values between the total of imports and the total of exports. In terms of the total balance of trade, other factors involving current accounts transactions such as dividends, royalty payments and management service fees would enter into its calculation. The Board has no substative information relating to the extent of these payments, but because of the large involvement of the multinational computer companies in Canada, the flow is believed to be almost entirely in favour of foreign countries, chiefly to the United States.

TRADE IN COMPUTING EQUIPMENT: SELECTED COUNTRIES

In order to place Canada's trade in computing equipment within a wider perspective, the Board examined the official statistical trade publications of certain other countries to determine how Canada has fared by comparison. The countries selected are responsible for most of the international trade in computing equipment, and include Canada's main trading partners. Belgium, Luxembourg, and the Netherlands have been included to complement the other EEC nations. Sweden has been included as that country's economic performance is frequently compared with that of Canada.

There are, however, some quite large discrepancies in the statistics relating to computing equipment trade. In a number of instances, the value of imports reported by country A as having been imported from country B, does not correspond to the value of exports reported by country B as having been exported to country A. There are many reasons for these discrepancies, including: differences in classification, differences in timing between shipments and receipts, differences in values, transshipments, and differences in rates of exchange. As a consequence, the Board has restricted its comparisons

to the total level of computing equipment trade, and has not attempted to analyse this trade by types of equipment or by sources and destinations. At a lower level of trade, the discrepancies tend to become magnified, and omissions and classification differences tend to thwart meaningful analysis. At the total level of trade, in spite of the discrepancies that are evident, the Board believes that the reported values of imports and exports are reliable indicators of trends, if not of absolute values.

Imports by Selected Countries

The values of imports of computing equipment by selected countries for 1966-1974 are shown in Table 7.9. Total values of imports towards the end of the period indicate that Canada was the fifth largest importer after West Germany, the United Kingdom, France and Japan. Its position therefore coincides with its ranking by value of installed computer systems as a percentage of GNP, as noted in Chapter IV. Canada's average annual rate of growth in imports at 17.8 per cent, was the lowest of any of the selected countries. West Germany and Japan, with 32.8 per cent (to 1973), and 31.5 respectively, had the highest average annual rates of growth, followed by Sweden, 28.2 per cent; the United States, 27.9 per cent; the Netherlands, 26.4 per cent; Italy, 25.7 per cent; Belgium and Luxembourg, 25.4 per cent; and France, 23.8 per cent. Apart from Canada, the only other selected country to have an average annual rate of growth in imports of computing equipment less than 20 per cent, was the United Kingdom with 19.4 per cent. All of these growth rates in imports bear impressive testimony to the buoyancy of the world-wide market for computing equipment.

It is of interest to note the differences between imports for different countries during the years in question. In 1966, the value of Canadian imports was roughly the same as those of France, which was second only to the United Kingdom. By 1974, Canadian imports were about two-thirds the value of French imports. Similarly, it was not until 1970 that the value of West German imports became larger than the value of Canadian imports, which, by 1973, were only about half the value of those of West Germany. Similar trends are seen for some of the other selected countries, and in the absence of information relating to their production during these years, they tend to suggest that the use of computers in these countries has evolved at a somewhat later stage than in Canada.

The sudden rise in Swedish imports in 1972, from a very low level in prior years, cannot be explained from such information as is available to the Board. The less sudden, but still noticeable rise in Japanese imports from 1972 to 1973, may well be due to the lessening of the import quota restrictions that were in place in that country. As these are due to be removed entirely, it might be expected that Japanese imports will grow rapidly in 1976 and 1977.

Table 7.9: Imports of Computer Hardware by Selected Countries, 1966 to 1974

Country	1966	1967	1968	1969	1970	1971	1972	1973	1974	Average Annual Rate of Growth, 1966-1974
				- $'million, Canadian -						%
Canada	113	136	131	187	226	282	338	348	421	17.8
United States	16	22	20	40	63	120	172	110	115	27.9
Japan	59	89	103	138	208	219	220	428	529	31.5
Sweden	29	9	7	4	8	6	122	137	212	28.2
United Kingdom	190	186	211	256	390	396	427	636	788	19.4
France	117	166	170	188	256	200	421	544	644	23.8
West Germany	93	127	126	181	256	278	597	675	..	32.8 (a)
Belgium and Luxembourg	24	31	27	32	60	73	95	136	147	25.4
Netherlands	33	44	37	52	88	89	121	155	215	26.4
Italy	61	99	47	105	137	142	197	270	382	25.7

(a) 1966-1973.

Source: Canada, Table 7.1.
U.S., United States Imports - Commodity by Country, 1966-1974.
Japan, Japan Exports and Imports, Commodity by Country.
Sweden, Sveriges Officiella Statistik, Utrikeshandel, 1966-1974.
U.K., Overseas Trade Statistics of the United Kingdom.
France, Statistiques du Commerce Extérieur de la France: Importations, 1966-1974.
West Germany, Spezialhandel nach Waren und Landern, 1966-1973.
Belgium and Luxembourg, Bulletin Mensuel du Commerce Extérieur de l'Union Economique Belgo-Luxembourgeoise, 1966-1974.
Netherlands, Centraal Bureau Voor de Statistick, 1966-1974.
Italy, Statistica Mensile del Commercio Con L'estero.

Exports by Selected Countries

The values of exports of computing equipment by selected countries for the period 1966 to 1974 are shown in Table 7.10. In total values of exports, the United States is the dominant exporting country, with more than twice the value in 1973 as West Germany, the second largest exporter. The United Kingdom and France, each with some 30 per cent of the value of U.S. exports in 1973, are the third and fourth largest exporters respectively. Canada was the fifth largest exporter in 1973, maintaining the same position as it occupied vis-à-vis imports, but its value of exports was less than one-tenth of those of the United States. Sweden exhibited an unexplained surge in exports in 1972 from a very low level in prior years, in much the same way as the previously sudden rise in imports occurred.

Average annual rates of growth in exports indicate that the highest rate was recorded by Belgium and Luxembourg at 60.7 per cent, but this was due to the low value figure of $2 million of exports in the base year of 1966. The second highest rate was recorded by the Netherlands at 38.3 per cent, but this was again from a very low base figure. Undoubtedly, the most impressive performance, because of the absolute values involved, was recorded by West Germany with the third highest rate of growth at 34.5 per cent. Between 1971 and 1973, West German computing equipment exports more than tripled, from $245 million to $813 million. Japan occupied the fourth position with 26.5 per cent. The United States, with the fifth highest rate of growth at 25.6 per cent, also maintained an impressive export performance, particularly in view of the extremely large values involved. Canada occupied sixth place in export rate of growth with 23.6 per cent, ranking ahead of Sweden at 20.5 per cent; France at 18.4 per cent; the United Kingdom at 16.6 per cent; and Italy at 13.7 per cent.

Possibly the most noticeable feature of the exports of selected countries during 1966-1974 is the export performance of Japan. Although the Japanese average annual rate of growth in exports of computing equipment at 26.5 per cent is high by any standard, the actual values are low in comparison to the other industrialized countries, and very low in comparison to virtually all other Japanese export except for aircraft. This may reflect the extent to which the international market for computing equipment has been dominated by the products of U.S.-based multinational computer companies.

Table 7.10: Exports of Computer Hardware by Selected Countries, 1966 to 1974

Country	1966	1967	1968	1969	1970	1971	1972	1973	1974	Average Annual Rate of Growth, 1966-1974
	-			$'million, Canadian			-			%
Canada[(a)]	36	51	50	73	112	151	186	168	197	23.6
United States	354	513	571	846	1,314	1,297	1,352	1,749	2,190	25.6
Japan	14	26	21	27	23	29	45	64	92	26.5
Sweden	32	14	7	7	10	8	85	104	142	20.5
United Kingdom	179	160	161	206	253	297	356	511	612	16.6
France	145	185	142	169	215	220	415	512	561	18.4
West Germany	102	75	71	127	177	245	658	813	-	34.5[(b)]
Belgium and Luxembourg	2	3	2	4	14	41	56	72	89	60.7
Netherlands	5	6	5	8	10	14	37	58	67	38.3
Italy	66	96	44	94	134	128	125	125	185	13.7

(a) Includes re-exports.
(b) 1966-1973.

Source: Canada, Table 7.5.
U.S., United States Exports - Commodity by Country, 1966-1974.
Japan, Japan Exports and Imports, Commodity by Country.
Sweden, Sveriges Officiella Statistik, Utrikeshandel, 1966-1974.
U.K., Overseas Trade Statistics of the United Kingdom.
France, Statistiques du Commerce Extérieur de la France: Exportations, 1966-1974.
West Germany, Spezialhandel nach Waren und Landern, 1966-1973.
Belgium and Luxembourg, Bulletin Mensuel du Commerce Extérieur de l'Union Economique Belgo-Luxembourgeoise, 1966-1974.
Netherlands, Centraal Bureau Voor de Statistick, 1966-1974.
Italy, Statistica Mensile del Commercio Con L'estero.

Balance of Trade: Selected Countries

The visible balances of trade in computing equipment for selected countries during 1966-1974 are shown in Table 7.11. Only one country, the United States, maintained a positive balance of trade throughout the entire period, and by 1974, its net exports of computer hardware were contributing in excess of $2 billion annually to that country's balance of payments. By the end of the period, one other country, West Germany, had gone from a deficit to a surplus position, recording surpluses of $61 million in 1972 and $137 million in 1973. Three other countries, Sweden, Italy, and France, had recorded small surpluses at the beginning of the period or intermittently throughout, but by the end of the period they had all moved into deficit positions. Canada, Japan, the United Kingdom, Belgium and Luxembourg, and the Netherlands all maintained deficit positions throughout the entire period.

In absolute imbalances of trade in computing equipment in 1973, Japan had the largest deficit at $364 million; Canada had the second largest deficit at $180 million; and Italy had the third largest deficit at $144 million. Other countries with deficits were the United Kingdom at $124 million; the Netherlands at $97 million; Belgium and Luxembourg at $64 million; Sweden at $33 million; and France at $32 million. Although these imbalances are of significance in themselves, they are difficult to assess unless they are related to other relevant measures. The Board has used one such measure in Table 7.12. This contrasts the trade balances or imbalances for selected countries against their respective populations.

This measure, on a per capita basis, indicates that Canada's imbalance of trade was either the largest or second largest throughout the period. The Netherlands had the largest imbalance in 1970 and in 1974, and the second largest imbalance in the intervening years. The deficit per capita incurred by Belgium and Luxembourg was usually the third largest throughout the period. In contrast, therefore, to the absolute deficit positions, where Japan, Canada, and Italy were the deficit leaders, on a per capita basis Japan and Italy are replaced by the Netherlands and Belgium and Luxembourg, and Canada remains among the leaders. Among the other countries in deficit in 1973, Sweden had about one-half the Canadian per capita deficit; Japan had slightly more than one-third; the United Kingdom and Italy had about one-quarter to one-third; and France had less than one tenth of the Canadian per capita deficit. The United States had the largest surplus per capita, and at $9.84 in 1974, it was almost as large as the deficit per capita for Canada in that year at $10.00.

Table 7.11: Visible Balance of Trade in Computer Hardware by Selected Countries, 1966 to 1974

Country	1966	1967	1968	1969	1970	1971	1972	1973	1974
				- $'million, Canadian -					
Canada	- 77	- 85	- 81	-113	- 114	- 131	- 152	- 180	- 225
United States	337	491	551	806	1,251	1,177	1,180	1,639	2,076
Japan	- 40	- 63	- 82	-111	- 185	- 190	- 175	- 364	- 437
Sweden	3	5	*	3	3	2	- 37	- 33	- 71
United Kingdom	- 11	- 26	- 49	- 50	- 137	- 99	- 71	- 124	- 176
France	28	19	- 28	- 19	- 41	20	- 6	- 32	- 83
West Germany	9	- 52	- 55	- 55	- 79	- 33	61	137	..
Belgium and Luxembourg	- 22	- 28	- 25	- 28	- 46	- 32	- 38	- 64	- 59
Netherlands	- 28	- 38	- 32	- 44	- 78	- 75	- 84	- 97	- 148
Italy	6	- 3	- 3	- 11	- 4	- 14	- 72	- 144	- 197

Source: Tables 7.9 and 7.10.

Table 7.12: Visible Trade Balances in Computer Hardware per Capita[(a)] for Selected Countries, 1970 to 1974

Country	1970	1971	1972	1973	1974
		-	Canadian dollars	-	
Canada	-5.35	-6.07	-6.89	-8.14	-10.00
United States	6.11	5.68	5.65	7.79	9.84
Japan	-1.78	-1.80	-1.64	-3.36	- 3.99
Sweden	0.35	0.19	-4.61	-4.02	- 8.63
United Kingdom	-2.48	-1.78	-1.27	-2.22	3.14
France	-0.80	0.39	-0.01	-0.62	- 1.58
West Germany	-1.30	-0.53	0.99	2.22	..
Belgium and Luxembourg	-4.77	-3.29	-3.92	-6.57	- 5.97
Netherlands	-6.02	-5.69	-6.34	-7.20	-10.91
Italy	-0.07	-0.26	-1.32	-2.63	- 3.56

(a) Population as of year end.

Source: International Financial Statistics, September 1975; Table 7.11.

From the foregoing it is seen that Canada's deficit balances in computing equipment place her among the leading deficit countries in this equipment in the industrialized world. In 1973, Canada had the second largest absolute imbalance and the first or second largest per capita imbalance from 1970 to 1974.

SUMMARY

Canadian imports of computing equipment and parts rose from \$113.4 million in 1966 to \$421.3 million in 1974; an average annual growth rate of 17.8 per cent. Imports of finished computer products supplied the bulk of Canadian market requirements, while imports of parts were mostly used for the assembly of finished computer products in Canada. The United States was by far the leading source of Canadian imports, accounting for almost 90 per cent in the 1971 to 1974 period. Information derived from the Board's survey of imports suggests that a very high proportion is attributable to transactions between affiliated companies.

Canadian exports of computing equipment and parts rose from \$36.5 million in 1966 to \$196.6 million in 1974; an average annual growth rate of 23.4 per cent. The rate of growth from 1971 to 1974, at 9.1 per cent, indicates a relative decline in exports in recent years. Most of Canada's production of computing equipment was exported, consisting mainly of peripheral equipment and parts, components and subassemblies. Most exports are believed to have been transactions between affiliated companies, and the chief destination was the United States. In 1974, re-exports accounted for more than one-quarter of total exports.

Canada's trade in computing equipment, therefore, takes place largely within a North American context, and is carried out mainly by companies with foreign affiliates. In broadest terms, the Canadian market is supplied by imports, while Canada's production of computing equipment is exported. This is due in large measure to the rationalization of production among affiliated companies.

From 1966 to 1974, Canada incurred annual visible trade deficits in computing equipment that grew from $77 million to $225 million. Although exports during the period grew at a faster rate than imports until 1972, the visible trade imbalances continued to widen in absolute terms. These imbalances, however, were not exceptional when contrasted with those of other selected Canadian manufacturing industries.

When Canada's trade in computing equipment is compared with the trade of other selected countries, Canada is shown to be both the fifth largest importer and exporter. This position coincides with its ranking in the value of installed computer systems when expressed as a percentage of GNP. Canada's average annual rate of growth in imports from 1966 to 1974, at 17.8 per cent, was the lowest of the selected countries. In exports, at an average annual rate of growth of 23.6 per cent for the same period, Canada ranked ahead of Sweden, the United Kingdom, France, and Italy. Canada's visible trade imbalances, however, whether measured in absolute or per capita terms, place her among the leading deficit countries in this equipment.

CHAPTER VIII: STRUCTURE OF PRODUCTION COSTS

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CHAPTER VIII: STRUCTURE OF PRODUCTION COSTS

In this chapter the Board examines the cost structure of the computing equipment manufacturing industry in Canada. Particular attention is given to the impact of the drawback provisions of the Customs Act. The cost structure of the computing equipment industry is also compared with that of other industries to indicate some of the characteristics which differentiate this industry from others. The extent to which the industry purchases material inputs from foreign rather than domestic sources is also considered, as well as the Canadian content of the industry. The final section presents a number of considerations concerning the competitive position of the Canadian industry as compared to that of the United States.

THE STRUCTURE OF FACTORY COSTS

Information on the factory cost of computing equipment produced by 24 companies engaged in 1972 in the manufacture of computer hardware in Canada was obtained by the Board through an industry survey for the year 1972. This survey also provided a breakdown of the factory cost of production between materials, parts, components and subassemblies, labour and factory overhead; the term "cost structure" refers to the relative importance of each of these elements in total factory costs.

Factory cost of production is not the same as the "value of shipments of goods of own manufacture" used by Statistics Canada. The factory cost of production represents the costs incurred in manufacturing at the factory level. It excludes general overhead expenses such as administration, marketing, promotion, research and development and other costs not incurred in the actual manufacturing process, and profits. The "value of shipments" represents the sales value of goods produced, f.o.b. plant, net of discounts, allowances, freight charges and sales and excise taxes, and includes, therefore, not only the factory cost of production, but also some of the general overhead expenses itemized above and profits.

Factory labour costs, as defined in the Board's survey, represent all direct and indirect labour costs, including fringe benefits, paid to labour engaged in, or directly related to, the manufacturing process. Direct labour cost consists of the payroll of workers engaged directly in manufacturing or assembling, including re-do and correction jobs; indirect labour costs comprise the payroll for workers engaged in subsidiary services essential to production, such as quality control and inspection, maintenance, materials handling, production engineering and factory supervision up to and including working foremen. The cost to the employer of fringe benefits of production and production-related workers is also part of factory labour costs and includes vacation, sick and holiday pay, pay for time not worked, medical group insurance and pension contributions and other employee benefits.

Factory cost of materials covers all costs of raw materials, plastic materials, packaging materials and semi-finished goods which are changed in shape or form during the production process. Factory cost of parts, components and subassemblies represented the cost of all inputs which are not altered during the manufacturing process, such as integrated circuits, logic panels, transistors and power supplies.

Factory overhead consists of a wide range of charges, including those for miscellaneous materials, supplies and equipment, tools, depreciation of plant and equipment, rent, fuel, light, insurance and taxes on plant and equipment, technical services and payroll for factory management and office services including fringe benefits.

The Board also obtained information on whether the materials and parts, components and subassemblies are acquired in Canada or are purchased from foreign sources. Not all the materials and parts designated as having been acquired in Canada are made in Canada; some of those acquired in Canada, to an extent unknown to the Board, represent purchases from Canadian distributors who may have imported them. Information was also provided with respect to the amount of duty actually paid on imported materials and parts, and the estimated amount of duty expected to be subject to drawback.

Of the 24 questionnaire returns from the Canadian manufacturers of computing equipment and parts, 15 replies were considered useful and these 15 companies accounted for 98.2 per cent of the total factory cost of production reported for all 24 companies in 1972. The data and the structure of factory costs for this sample can, therefore, be assumed to be representative of all producers in the industry.

In Tables 8.1, 8.2, and 8.3, dealing with the cost structure of the factory cost of production of the 15 companies, the cost of materials and of parts, components and subassemblies acquired outside Canada does not include the duties paid on these imports; the duties paid are listed separately. Factory cost of materials and parts, and the total factory cost of production, as reported by the responding companies, does not allow for the drawbacks of duties, because the duties are seldom returned in the year in which they are paid. The duties remitted do not reduce production costs for the year that the duties are paid, rather they increase revenues from sources other than sales in the year in which they are paid. However, in order to examine the impact of the drawback of duties, the Board in calculating the factory cost of production after duty drawback, assumed that the return of duties takes place in the same year as they are paid.

The breakdown of factory costs, as shown in Table 8.1, indicates that the production of computers, peripherals and related telecommunications equipment in Canada requires a high proportion of materials, and parts, components and subassemblies; these accounted in 1972 for 70.8 per cent of total factory costs of production. The ratio of factory labour to total factory cost was 19.4 per cent, and factory overhead comprised 9.9 per cent.

Table 8.1: The Structure of Factory Costs for Computing Equipment and Parts Produced by 15 Manufacturers in Canada, 1972

Cost Category	Factory Costs Including Duty Paid: Percentage of Total Factory Cost	Factory Costs Including Duty Paid: Percentage of Total Factory Cost, by Category	Factory Costs After Duty Drawback: Percentage of Total Factory Cost	Factory Costs After Duty Drawback: Percentage of Total Factory Cost, by Category
	- per cent -			
Factory Labour				
Direct	5.8	19.4	6.2	20.8
Indirect	10.7		11.5	
Fringe benefits	2.9		3.1	
Sub-total	19.4		20.8	
Materials		70.8		68.6
Acquired in Canada	5.4(a)		5.7	
Acquired outside Canada	3.0(a)		3.2	
Duty paid on these	0.4		0.1(b)	
Duty subject to drawback	-		-	
Sub-total	8.8		9.0	
Parts/Components/Subassemblies				
Acquired in Canada	6.6(a)		7.0	
Acquired outside Canada	48.8(a)		52.4	
Duty paid on these	6.6		0.1(b)	
Duty subject to drawback	-		-	
Sub-total	62.0		59.6	
Factory Overhead				
Municipal taxes	0.6	9.9	0.6	10.6
Heat, light, power	0.7		0.8	
Plant depreciation	0.8		0.8	
Equipment depreciation	2.4		2.6	
Other	5.4		5.8	
Sub-total	9.9		10.6	
Total Factory Cost	100.0	100.0	100.0	100.0

(a) Costs excluding duties paid.

(b) Percentage figure refers to net duty paid, i.e., total duty paid minus drawback.

Source: Tariff Board.

The composition of factory labour cost for the computing equipment industry showed that indirect labour was greater than the cost of labour directly engaged in manufacturing or assembly operations. Of the total factory labour cost of the sampled companies, indirect labour accounted for 55.4 per cent and direct labour for 29.9 per cent; the cost of fringe benefits, which would probably be divided proportionately between indirect and direct factory labour, comprised 14.7 per cent.

Of the total cost of materials and parts, components and subassemblies used by the industry, materials constituted 12.4 per cent and parts, components and subassemblies, 87.6 per cent. It is evident that this industry is inclined to depend to a large degree on imported parts, 89.4 per cent in 1972. Materials are, not unexpectedly, obtained mostly in Canada, although imports of materials - 38.9 per cent in 1972 - still accounted for a substantial portion of all materials purchased.

The 15 producers of computer hardware paid $11.4 million of duties in 1972 on imports of materials and parts, components and subassemblies valued at $84.1 million.(1) The average rate of duty paid was 13.6 p.c.; this substantiates the average rate of duty calculated on the basis of the Board's import analysis in Chapter III.(2) The average rate of duty paid on imported materials came to 14.5 p.c., and on parts, components and subassemblies to 13.5 p.c. The duty paid represented some 7 per cent of the total factory cost of production.(3) Total imports of duty paid materials and parts amounted to $95.4 million in 1972, or nearly 60 per cent of total factory cost of production.

Expected duty drawback on 1972 imports of materials and parts was estimated at $11.1 million. This represented 97.7 per cent of all duties paid, indicating, as mentioned before, that the computing equipment industry in Canada exports most of its production. It is evident that the drawback of duties paid removes almost entirely the cost of the tariff on materials and parts.

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(1) The duties paid are net of duties remitted, before importation, under tariff item 42700-1; see also Chapter III, p. 103.

(2) The average rate of duty calculated on imported materials and parts in Chapter III is 13.87 p.c.

(3) This estimate is higher than that stated by the spokesman for Datagen of Canada Ltd. at the public sittings: "Our tariff cost as a per cent of manufacturing cost, is approximately 5%," (Transcript, Volume III, p. 238). The lower tariff cost for Datagen is perhaps more related to over all manufacturing costs rather than to the factory costs alone.

Foreign-Owned Subsidiaries and Canadian-Owned Companies

The structure of factory costs, with duties paid and after drawback, are shown in Tables 8.2 and 8.3 for the foreign-owned subsidiaries and the Canadian-owned companies of the Board's sample of 15 manufacturers.

Of the total 1972 factory cost of production before duty drawback for the sampled companies, 93.4 per cent was produced by the nine subsidiaries of multinational corporations, and 6.6 per cent by the six Canadian-owned companies. Despite the fact that there were significant differences between the two groups with respect to kinds of equipment produced and scale of production, the structure of their factory cost of production was quite similar. The factory labour used by foreign-owned companies was 19.3 per cent of the total factory cost, and that used by the Canadian-owned companies was 20.1 per cent. Materials, parts, components and subassemblies used by the two types of companies accounted, on average, for 70.7 per cent and 71.4 per cent of the total, respectively, and factory overhead for 10.0 per cent and 8.6 per cent. Both foreign-owned and Canadian-owned companies relied heavily on imports for their purchases of materials and parts, components and subassemblies, 83.4 per cent as against 79.2 per cent. Canadian-owned manufacturers of computing equipment and parts, in 1972, obtained a slightly greater proportion of their parts and components from domestic sources than foreign-owned subsidiaries, but, somewhat surprisingly, less of materials.

The average rate of duty paid on imported materials and parts came to 13.6 p.c. for each of the two groups of companies. Foreign-owned companies, on average, expected a drawback of 98.3 per cent of all duties paid, and domestically owned companies 88.5 per cent. While the latter expected to end up with a somewhat larger net duty cost, it would appear that both groups of companies export a very large proportion of their output and consequently, by exercising the available duty drawback provisions, avoid most of the cost of the duty on imported materials and parts. The net cost of such duty, after drawback, amounted to only 0.13 per cent of total factory production cost for foreign-owned companies and 0.82 per cent for Canadian-owned companies.

Table 8.2: The Structure of Factory Costs, Including Duty Paid, Foreign-Owned Subsidiaries and Canadian-Owned Companies, 1972

Cost Category	Foreign-Owned Subsidiaries: Percentage of Total Factory Cost	Foreign-Owned Subsidiaries: Percentage of Total Factory Cost, by Category	Canadian-Owned Companies: Percentage of Total Factory Cost	Canadian-Owned Companies: Percentage of Total Factory Cost, by Category
		- per cent -		
Factory Labour				
Direct	5.7		7.5	
Indirect	10.8	19.3	9.9	20.0
Fringe benefits	2.9		2.7	
Sub-total	19.3		20.0	
Materials				
Acquired in Canada	5.4		4.8	
Acquired outside Canada	2.8		5.2	
Duty paid on these	0.4		0.9	
Duty subject to drawback	-		-	
Sub-total	8.6		10.9	
		70.7		71.4
Parts/Components/Subassemblies				
Acquired in Canada	6.3 (a)		10.0	
Acquired outside Canada	49.1 (a)		44.6	
Duty paid on these	6.6		5.9	
Duty subject to drawback	-		-	
Sub-total	62.1		60.4	
Factory Overhead				
Municipal taxes	0.6		0.5	
Heat, light, power	0.8		0.5	
Plant depreciation	0.8	10.0	0.4	8.6
Equipment depreciation	2.5		1.9	
Other	5.4		5.2	
Sub-total	10.0		8.6	
Total Factory Cost	100.0	100.0	100.0	100.0

(a) Cost excluding duties paid.

Source: Tariff Board.

Table 8.3: The Structure of Factory Costs, After Duty Drawback, Foreign-Owned Subsidiaries and Canadian-Owned Companies, 1972

Cost Category	Foreign-Owned Subsidiaries: Percentage of Total Factory Cost	Foreign-Owned Subsidiaries: Percentage of Total Factory Cost, by Category	Canadian-Owned Companies: Percentage of Total Factory Cost	Canadian-Owned Companies: Percentage of Total Factory Cost, by Category
	- per cent -			
Factory Labour				
Direct	6.1	20.8	8.0	21.4
Indirect	11.6		10.5	
Fringe benefits	3.1		2.9	
Sub-total	20.8		21.3	
Materials				
Acquired in Canada	5.8	68.5	5.2	69.5
Acquired outside Canada	3.1 (a)		5.5 (a)	
Duty paid on these	* (b)		0.7 (b)	
Duty subject to drawback	-		-	
Sub-total	8.9		11.3	
Parts/Components/Subassemblies				
Acquired in Canada	6.8		10.6	
Acquired outside Canada	52.8 (a)		47.4 (a)	
Duty paid on these	0.1 (b)		0.2 (b)	
Duty subject to drawback	-		-	
Sub-total	59.7		58.2	
Factory Overhead				
Municipal taxes	0.6	10.7	0.6	9.1
Heat, light, power	0.8		0.6	
Plant depreciation	0.8		0.5	
Equipment depreciation	2.7		2.0	
Other	5.8		5.5	
Sub-total	10.7		9.1	
Total Factory Cost	100.0	100.0	100.0	100.0

(a) Costs excluding duty paid.

(b) Percentage figure refers to net duty paid, i.e., total duty paid minus duty drawback.

Source: Tariff Board.

Cost Structure by Type of Product

This subsection examines the cost structure for the three main groups of computer hardware: mainframes, peripherals and related telecommunications equipment. The Board was unable to classify the cost data precisely by product group because some companies were unable to provide data on this basis; consequently the cost data were arranged into three groups of manufacturers, in accordance with their most representative product; as shown in Tables 8.4 and 8.5. As a result, while the cost structure for peripheral manufacturers relates primarily to peripheral equipment, it also covers other computing equipment and subassemblies of equipment produced by them.

Of the total factory cost of production, reported to the Board by the 15 sample companies, manufacturers of mainframes accounted for 7.6 per cent, manufacturers of peripheral equipment for 90.3 per cent, and manufacturers of related telecommunications equipment for 2.1 per cent. The structure of factory costs for each group of manufacturers appears to differ considerably from each other, especially between peripheral manufacturers and the other two groups. Peripheral manufacturers appear on average to be more parts intensive and less labour intensive. In 1972, the manufacturers of mainframes used nearly twice as much factory labour as the manufacturers of peripherals. The data by product group must be considered with some caution, however, as each group is composed of a small sample of producers and differences in accounting practices may cause anomalies at the group level that are not noticeable at the industry level, e.g., the high proportion of overhead costs for mainframe manufacturers.

Each group of manufacturers imports most of its requirements of materials, parts, components and subassemblies; however, related telecommunications equipment manufacturers imported a smaller proportion, 73.4 per cent, than mainframe and peripherals producers, who imported 92.6 per cent and 82.8 per cent, respectively. The first group of manufacturers acquired, in 1972, 26.6 per cent of its parts, components and subassemblies from domestic sources,(1) compared to 7.4 per cent for mainframe and 17.2 per cent for peripheral manufacturers. Assuming that domestic materials and parts are more costly than imported goods, by the level of the tariff, for instance, then these higher costs will affect production costs of manufacturers of related telecommunications equipment most and mainframe producers least.

The average rate of duty paid on imported materials, parts, components and subassemblies was 10.7 p.c. for mainframe manufacturers, 13.7 p.c. for peripheral producers and 13.1 p.c. for manufacturers of related telecommunications. The expected duty drawback was estimated at 85.9 per cent of the duty paid on imported materials, parts, components and subassemblies for mainframes, 99.0 per cent for peripherals and 61.3 per cent for related telecommunications equipment. These figures suggest that while all three groups export a very large proportion of their output, manufacturers of related telecommunications equipment are much less export oriented than the other two groups and necessarily absorb more of the duties paid on imported materials and parts. The average rate of duty, after expected drawback, amounted to 1.5 p.c. for mainframe producers, 0.14 p.c. for peripherals, and 5.1

(1) All related telecommunications equipment manufacturers are Canadian-owned.

Table 8.4: The Structure of Factory Costs, Including Duty Paid, by Type of Product, 1972

Cost Category	All Computing Equipment (15 Companies)		Mainframe Manufacturers (5 Companies)		Peripheral Manufacturers (6 Companies)		Related Telecommunications Equipment Manufacturers (4 Companies)	
	%	%	%	%	%	%	%	%
Factory Labour								
Direct	5.8		18.5		4.5		13.7	
Indirect	10.7	19.4	6.4	31.7	11.2	18.2	7.1	23.7
Fringe benefits	2.9		6.9		2.5		2.9	
Sub-total	19.4		31.7		18.2		23.7	
Materials								
Acquired in Canada	5.4		2.0		5.7		1.6	
Acquired outside Canada	3.0		7.4		2.4		12.5	
Duty paid on these	0.4		0.8		0.4		2.2	
Duty subject to drawback	-		-		-		-	
Sub-total	8.8		10.2		8.5		16.3	
Parts/Components/Subassemblies		70.8		46.9		72.8		68.8
Acquired in Canada	6.6		1.5		6.8		16.7	
Acquired outside Canada	48.8		31.9		50.6		32.1	
Duty paid on these	6.6		3.4		6.9		3.7	
Duty subject to drawback	-		-		-		-	
Sub-total	62.0		36.8		64.3		52.5	
Factory Overhead								
Municipal taxes	0.6		0.1		0.6		0.3	
Heat, light, power	0.7		1.4		0.7		0.2	
Plant depreciation	0.8	9.9	2.5	21.4	0.6	9.0	*	7.5
Equipment depreciation	2.4		3.4		2.4		0.8	
Other	5.4		14.0		4.6		6.1	
Sub-total	9.9		21.4		9.0		7.5	
Total Factory Cost	100.0	100.0	100.0	100.0	100.0	100.0	100.0	

Source: Tariff Board.

Table 8.5: The Structure of Factory Costs, After Duty Drawback, by Type of Product, 1972

Cost Category	All Computing Equipment (15 Companies)		Mainframe Manufacturers (5 Companies)		Peripherals Manufacturers (6 Companies)		Related Telecommunications Equipment Manufacturers (4 Companies)	
	%	%	%	%	%	%	%	%
Factory Labour								
Direct	6.2		19.2		4.9		14.2	
Indirect	11.5	20.8	6.6	32.9	12.0	19.6	7.4	24.6
Fringe benefits	3.1		7.1		2.7		3.0	
Sub-total	20.8		32.9		19.6		24.6	
Materials								
Acquired in Canada	5.7		2.0		6.2		1.7	
Acquired outside Canada	3.2		7.7		2.6		13.0	
Duty paid on these	0.1 (a)		0.1 (a)		* (a)		2.0 (a)	
Duty subject to drawback	-		-		-		-	
Sub-total	9.0		9.8		8.8		16.7	
		68.6		44.9		70.7		67.7
Parts/Components/Subassemblies								
Acquired in Canada	7.0		1.5		7.3		17.3	
Acquired outside Canada	52.4		33.1		54.6		33.3	
Duty paid on these	0.1 (a)		0.5 (a)		0.1 (a)		0.3 (a)	
Duty subject to drawback	-		-		-		-	
Sub-total	59.6		35.1		61.9		50.9	
Factory Overhead								
Municipal taxes	0.6		0.1		0.7		0.3	
Heat, light, power	0.8		1.4		0.8		0.3	
Plant depreciation	0.8	10.6	2.6	22.2	0.7	9.7	*	7.8
Equipment depreciation	2.6		3.5		2.6		0.9	
Other	5.8		14.5		5.0		6.3	
Sub-total	10.6		22.2		9.7		7.8	
Total Factory Cost	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(a) Percentage refers to net duty paid, i.e., total duty paid minus duty drawback.

Source: Tariff Board.

p.c. for related telecommunications equipment. The duty paid on materials and parts, after duty drawback, was not an important factor in total factory costs of production for any of the three groups of equipment manufacturers; even for manufacturers of related telecommunications equipment, it represented only 2.3 per cent.

Canadian Content of Computing Equipment Production

The Canadian content[1] of computing equipment production in 1972 before duty drawback amounted to slightly over 40 per cent. The expected duty drawback, which reduced the cost of the imported content, raises this proportion to an average of close to 45 per cent; a more realistic figure because it is based on the net amount of duty paid after the drawback of duties. The Canadian content for Canadian producers was slightly higher than that of the foreign-owned companies: 46.2 per cent against 44.1 per cent, calculated after duty drawback. The six manufacturers producing mostly peripheral equipment realized the lowest average Canadian content in 1972 of 42.8 per cent. For the five mainframe producers it was 58.7 per cent, and for the four producers of related telecommunications equipment, it was 51.4 per cent. The Board also obtained confidential information about the Canadian content of individual items of computing equipment. This indicates that Canadian content can vary from 20 per cent to as high as 99 per cent from one type of equipment to another, even when produced by the same company.

INTER-INDUSTRY AND CANADA-U.S. COMPARISONS

The purpose of this section is to compare the cost structure of Canadian computing equipment manufacturing industry with that of some other selected Canadian manufacturing industries, and a similar industry in the United States. Such a comparison is made difficult by the fact that the available published statistics for Canadian and U.S. manufacturing industries report production on the basis of "value of shipments", whereas the companies responding to the Board's survey provided useful data with respect to factory cost of production. The two measurements of production are, as explained earlier in this chapter, not comparable. In order to circumvent this problem, the Board selected the office and store machinery industry in Canada[2] in place of the companies producing computing equipment which responded to the Board's survey. While this substitution raises problems of strict comparability, it was felt that the office and store machinery industry was fairly representative; computing equipment represents

(1) For purposes of this Report, Canadian content consists of materials, parts and components produced in Canada, the total cost of factory labour and factory overhead; in other words, the total factory cost of production minus the duty paid cost of imported materials, parts and components. In the above calculations, it was assumed that all materials and parts acquired in Canada were also Canadian made. As mentioned previously, this is not entirely so and therefore, the degree of Canadian content indicated is somewhat overstated.

(2) Standard Industrial Classification No. 318.

between two-thirds and three-quarters of its total value of shipments of goods of own manufacture, and the computing equipment covered by the statistics of that industry accounted for more than 75 per cent of all computing equipment produced in Canada in 1972. Not surprisingly, as shown in Table 8.6, the cost structure of the fifteen producers reporting to the Board's survey, and that of the office and store machinery industry, is very comparable.

Table 8.6: Factory Cost of Production of Goods of Own Manufacture[(a)]; 15 Producers of Computing Equipment and the Office and Store Machinery Industry, 1972

	15 Producers of Computing Equipment		Office and Store Machinery Industry	
	$'mil.	%	$'mil.	%
Wage cost - production workers	31.4	21.3	38.3	18.5
Cost of materials & supplies	114.7	77.9	167.7	80.8
Cost of fuel & electricity	1.2	0.8	1.5	0.7
Total	147.3	100.0	207.5	100.0

(a) Excludes factory overhead costs, which could not be broken out for the office and store machinery industry from published information.

Source: Tariff Board; Statistics Canada.

The scope of manufacturing activity and total activity for the office and store machinery industry is presented in Table 8.7; total activity includes non-manufacturing activity which consists of the cost and the value of shipments of goods acquired solely for resale. Manufacturing activity is the more useful concept for the purposes of this Reference since it deals with the costs and the value of the goods manufactured by this industry in Canada; this measurement is used to compare the office and store machinery industry, and implicitly the Canadian computer equipment industry with other selected Canadian manufacturing industries. Total activity data are presented because they are used in this section to compare the Canadian industry with the U.S. electronic computing equipment industry; published figures for the U.S. industry are based on total activity.

In the office and store machinery industry, a substantial proportion of total activity consists of non-manufacturing, in fact around 30 per cent of all goods shipped during 1971-1973 were goods purchased for resale. Non-manufacturing activity in this instance includes the resale of computing equipment imported into Canada by Canadian subsidiaries of United States producers. As over 90 per cent of Canada's requirements of computing equipment are imported mostly by manufacturers of this equipment in Canada, it is not surprising that a substantial portion of this activity is of the non-manufacturing type.

Table 8.7: Office and Store Machinery Industry: Cost Structure, Manufacturing and Total Activity, 1971, 1972, and 1973

	1971		1972		1973	
	$'mil.	%	$'mil.	%	$'mil.	%
Manufacturing Activity						
Cost of materials used	136.5	66.1	167.6	63.4	171.1	58.0
Cost of fuel and electricity	0.8	0.4	1.5	0.6	2.0	0.7
Value added by manufacture	69.1	33.5	95.1	36.0	121.9	41.3
wages	32.3	15.6	38.3	14.5	47.7	16.2
other value added	36.9	17.9	56.8	21.5	74.2	25.2
Value of shipments of goods of own manufacture	206.5	100.0	264.3	100.0	295.0	100.0
Total Activity						
Cost of materials, supplies and goods for resale	181.8	59.6	208.8	57.6	225.7	55.0
Cost of fuel and electricity	0.8	0.3	1.5	0.4	2.0	0.5
Value added	122.3	40.1	152.3	42.0	183.1	44.6
wages and salaries	74.6	24.5	90.8	25.0	109.6	26.7
other value added	47.7	15.7	61.5	17.0	73.5	17.9
Value of shipments and other revenue[a]	304.9	100.0	362.7	100.0	410.8	100.0

(a) Figures have been adjusted for inventory.

Source: Statistics Canada.

In terms of manufacturing activity, the office and store machinery industry is fairly typical with respect to its cost structure, relative to all manufacturing. Fifty-eight per cent of the value of shipments of goods of own manufacture in 1973 was made up of the cost of materials, supplies, parts, components and subassemblies; less than 1 per cent consisted of the cost of fuel and electricity; while about 41 per cent represented value added by manufacturing[1] of which 16 percentage points was the cost of production and production-related labour, and 25 percentage points the other costs such as capital depreciation, interest, advertising and promotion. The details are shown in Table 8.8. This cost structure is also not very different from that of the household radio and television receiver industry which is similar to the office and store machinery industry in that it is primarily an assembly operation; it is also similar in techniques, technology and degree of foreign ownership.

(1) Value added, manufacturing activity: value of shipments of goods of own manufacture plus net change in inventory of goods in process and finished goods, less cost of materials and supplies used, fuel and electricity.

The communications equipment industry's cost structure has a relatively low proportion of materials and parts and a high proportion of value added; within value added, the relative use and cost of labour would appear high by comparison, as are the "other" costs. The communications equipment industry has a relatively high degree of Canadian ownership and control and is, because of greater vertical integration of the various stages of manufacturing, a manufacturer rather than an assembler. This industry also has a relatively high commitment to research and development.

Table 8.8: Value of Shipments of Goods of Own Manufacture: Percentage Distribution, All Manufacturing, the Office and Store Machinery Industry and Other Selected Industries, 1973

Components	All Manufacturing	Office & Store Machinery	Communications Equipment	Household Radio & TV
		- per cent -		
Cost of materials and supplies	55.6	58.0	38.2	61.4
Cost of fuel and electricity	1.8	0.7	0.5	0.3
Value added by manufacture	42.6	41.3	61.4	38.3
wages	14.9	16.2	18.9	10.7
other value added	27.7	25.2	42.5	27.6
Value of Shipments[(a)]	100.0	100.0	100.0	100.0

(a) Value of shipments has been adjusted for inventory.

Source: Statistics Canada.

Comparing the office and store machinery industry with the electronic computing equipment industry in the United States, the most striking difference, as shown in Table 8.9, is in the size of the respective industries. The U.S. industry, with total shipments valued at $6.4 billion was in 1972 close to 25 times larger than the Canadian industry with sales of $264 million. The comparison is not unduly affected by the fact that the U.S. data are on the basis of total activity and the data for the Canadian industry on manufacturing activity.[(1)] It is believed that the U.S. industry itself produces

(1) The comparison of manufacturing activity of the office and store machinery industry in Canada, with the total activity of the electronic computing equipment industry in the United States was considered to be more appropriate than the comparison of total activity of the two industries. The nature of the Canadian industry is such that over 30 per cent of its total activity is involved with goods imported for resale, whereas the equivalent figure for the U.S. industry is less than 2 per cent, indicating that U.S. total activity is almost wholly confined to manufacturing. Figures relating solely to manufacturing activity in the U.S., however, are not published.

Table 8.9: Office and Store Machinery Industry in Canada and the Electronic Computing Equipment Industry in the United States: Cost Structure 1971, 1972, and 1973

Cost	Office and Store Machinery Industry[a]			Electronic Computing Equipment Industry[b]		
	1971	1972	1973	1971	1972	1973
	- $'million, Canadian -					
Cost of materials and supplies	136.5	167.6	171.1	2,223.5	2,952.4	3,709.9
Cost of fuel and electricity	0.8	1.5	2.0	(c)	(c)	(c)
Value added	69.1	95.1	121.9	2,704.2	3,464.4	4,264.2
wages and salaries	32.3	38.3	47.7	1,465.4	1,652.5	1,889.6
other value added	36.9	56.8	74.2	1,238.8	1,811.9	2,374.6
Value of shipments	206.5[d]	264.3[d]	295.0[d]	4,927.7	6,416.8	7,974.1
	- per cent -					
Cost of materials and supplies	66.1	63.4	58.0	45.1	46.0	46.5
Cost of fuel and electricity	0.4	0.6	0.7	(c)	(c)	(c)
Value added	33.5	36.0	41.3	54.9	54.0	53.5
wages and salaries	15.6	14.5	16.2	29.7	25.8	23.7
other value added	17.9	21.5	25.2	25.2	28.2	29.8
Value of shipments	100.0	100.0	100.0	100.0	100.0	100.0

(a) Manufacturing activity.
(b) Total activity.
(c) Included with cost of materials and supplies.
(d) Figures have been adjusted for inventory.

Source: Statistics Canada; U.S. Department of Commerce.

most of the equipment it sells and that therefore by far the largest proportion of its shipments consist of goods of own manufacture. Measured in terms of value added, the U.S. industry in 1972 was some 37 times larger at $3.5 billion than the Canadian industry at $95 million.

The comparison of the cost structure of the two industries in Table 8.9 indicates that the Canadian industry spends, relatively, considerably more on materials, parts, components and subassemblies and, therefore, adds substantially less value to these inputs than the U.S. industry, 54.0 per cent as against 36.0 per cent. Relatively less value is added by the Canadian industry because it uses less labour and incurs less "other" costs. In terms of value added, the measure of the net contribution of an industry to total economic activity, the Canadian office and store machinery industry compares less favourably with the U.S. electronic computing equipment industry.

There are several reasons which could possibly explain why the U.S. industry is so much more labour intensive than the Canadian industry, 25.8 per cent as against 14.5 per cent. The Canadian industry exports a very large proportion of its output, mostly to the United States, and consequently the manpower and expenses involved in marketing and servicing the Canadian output is low compared to that of the U.S. industry, which, while a large exporter, ships a much larger proportion of its production to its home market. Most of the marketing and administration employment reported by Canadian producers(1) relates to equipment imported for resale in Canada. Another possible factor is the higher proportion spent by the U.S. industry on research and development of which a major component is salaries and wages.(2) The comparison reflects a Canadian industry which carries out very little manufacturing of parts and components and whose main activity is the assembly of imported parts, components and subassemblies into subassemblies and complete equipment, mostly for export markets.

Canada-U.S. Comparisons

The first part of this chapter deals with the cost structure of the Canadian computing equipment producers. This part discusses the unit cost of the various inputs such as materials and labour, productivity and factors affecting productivity. The discussion will focus on differences in unit costs of production between the computing equipment industries in Canada and the United States and will conclude with some remarks pertaining to average unit production costs in the two countries.

The Board was unable to obtain comparable data on unit costs of production for specific units of computing equipment manufactured or assembled in Canada and in other competing countries. Cost accounts are rarely kept on a product-by-product basis or in a form that is comparable. Furthermore, the identification of identical or similar products produced in both Canada and abroad, created further difficulties. Therefore much of the evidence used in this section is

(1) See Chapter IV, p. 152.
(2) ibid., p. 161.

inferential and aggregative in nature and, with respect to the Canadian industry, it refers mostly to the office and store machinery industry and not to the 15 manufacturers of computing equipment surveyed by the Board. Notwithstanding these reservations, the Board believes that the differences indicated between the two industries, though not precise, are realistic and acceptable with respect to orders of magnitude.

Cost of Materials, Supplies, Parts, Components and Subassemblies

Canadian computing equipment manufacturers import most of their requirements of materials, parts, components and subassemblies, 87 per cent in 1972. However, most of the duty paid is drawn back; thus any additional cost due to the duty is almost entirely avoided. Consequently, these imported materials and parts cost the Canadian computer equipment manufacturers substantially the same as the U.S. manufacturers, except for the additional freight and handling charges. Moreover, for large multinational companies, procuring materials, supplies and parts on an international basis with a high degree of specialization among their plants, these charges would add very little to the cost of producing computing equipment in Canada. Small independent Canadian-owned equipment manufacturers might well face a greater disadvantage with respect to the cost of imported materials and parts. Since they, on average, export less of their output, they receive less duty drawback and thus must absorb the cost of the duty in part. Also, they probably purchase some imported materials and parts from Canadian distributors, and must, to that extent, absorb the cost of the distributor's mark-up.

Canadian computing equipment manufacturers who purchase Canadian-made materials, supplies, and parts, are, generally, at a disadvantage in relation to United States producers of such equipment. Confidential information supplied to the Board indicates that Canadian producers of materials and parts, generally speaking, are not price competitive with foreign suppliers. The effect of this cost disadvantage for the industry as a whole is small because, as demonstrated earlier in this chapter, the proportion of all materials, supplies and parts purchased by the Canadian computing equipment industry that is made in Canada is only 13 per cent. On the assumption that Canadian-made inputs are 15 per cent more costly,(1) the purchase of these inputs would, on average, add only 2 per cent to the cost of all materials, supplies and parts. Some individual computing equipment producers, mostly small Canadian-owned companies, purchase more than 13 per cent of their inputs from Canadian manufacturers, and, therefore, encounter a greater overall cost disadvantage with respect to materials, supplies and parts than the computing equipment industry as a whole. For example, in 1972, three Canadian computing equipment manufacturers purchased at least 40 per cent of their requirements of materials and parts from domestic suppliers. Under the same assumption, these Canadian purchases would add 6 per cent to their over-all cost of materials and parts.

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(1) Fifteen p.c. would be close to the average level of tariff protection available to Canadian manufacturers of materials and parts.

Labour Costs

The computing equipment industry is a relatively high-wage industry in Canada as well as in the United States. Average hourly earnings for all employees in the Canadian office and store machinery industry and the U.S. electronic computing industry are well above the levels of manufacturing as a whole in these two countries, as shown in Table 8.10. Average hourly earnings of production-related workers are substantially lower than those of non-manufacturing employees, especially in the U.S. industry; in fact, it is the earnings of the large proportion of employees engaged in research and development, software development, programming and systems analysis, marketing and customer service that raises the level of employee earnings above that for all manufacturing; it is only in part due to the average hourly earnings of production workers.

Average hourly earnings in the Canadian industry were about 20 per cent less than in the U.S. industry in 1971 and 1972, $4.29 as against $5.43 and $4.48 as against $5.71. This difference was particularly attributable to non-manufacturing workers, who earned, on an hourly basis, some 30 per cent less in Canada than in the United States in 1971 and 1972. Average hourly earnings of production workers in the Canadian industry were only some 5 per cent below those in the U.S. industry, $3.91 as against $4.15 in 1972. As could be expected, there is considerable variation from the industry average for production-related workers among individual Canadian manufacturers; according to information supplied to the Board, such costs varied in 1971 from somewhat less than $2 to more than $4.

For purposes of examining the relative advantage or disadvantage of Canadian computing equipment production, the difference in average hourly earnings of production and production-related workers is more significant than that of non-manufacturing employees. This is so because the earnings of production workers comprise most of the labour cost of producing computing equipment in Canada; most of the output is exported and thus requires relatively few non-manufacturing employees in Canada. Most non-manufacturing workers in the Canadian industry are related to the marketing and distribution of computing equipment imported by Canadian subsidiaries for resale in Canada - Canada imports nearly all of its requirements of computing equipment - and therefore, the lower average hourly earnings for these employees does not confer an advantage to the production of computing equipment in Canada.

The foregoing and Table 8.10 indicate that the Canadian computing equipment manufacturer enjoyed a small advantage over the U.S. producer with respect to hourly costs of production employees. However, recent information on hourly earnings in manufacturing as a whole in the two countries suggests that this advantage in hourly labour costs may have disappeared. Hourly earnings in Canadian manufacturing have increased much more rapidly than hourly earnings in U.S. manufacturing during 1974 and 1975, with the result that average hourly earnings in Canadian manufacturing, adjusted for differences in the Canada-United States exchange rate, were some 3 to 4 per cent higher than those in the United States during the first four months of 1975.

Table 8.10: Average Hourly Earnings:[a] Production Workers, Non-Manufacturing Workers and All Employees; the Office and Store Machinery Industry and All Manufacturing in Canada and the Electronic Computing Equipment Industry and All Manufacturing in the United States, 1971-1973

	1971	(a)	1972	(b)	1973	(b)
	$	%	$	%	$	%
Canada						
Office and Store Machinery Manufacture						
Production workers	3.66	86.9	3.91	94.2	4.34	100.2
Non-manufacturing workers	4.69	72.9	4.73	68.3	5.48	72.6
All employees	4.29	79.0	4.48	78.5	5.04	83.9
All Manufacturing						
Production workers	3.19	85.5	3.44	88.0	3.77	89.5
Non-manufacturing workers	4.68	80.7	5.02	81.2	5.43	82.0
All employees	3.72	86.7	4.00	88.1	4.35	89.5
United States[c]						
Electronic Computing Equipment						
Production workers	4.21	100.0	4.15	100.0	4.33	100.0
Non-manufacturing workers	6.43	100.0	6.93	100.0	7.55	100.0
All employees	5.43	100.0	5.71	100.0	6.01	100.0
All Manufacturing						
Production workers	3.73	100.0	3.91	100.0	4.21	100.0
Non-manufacturing workers	5.80	100.0	6.18	100.0	6.62	100.0
All employees	4.29	100.0	4.54	100.0	4.86	100.0

(a) Calculated by dividing the wages and salaries by the man-hours paid. Where information with respect to the number of man-hours paid was unavailable, it was assumed that the average employee works a total of 2,000 hours per year.
(b) Index - United States = 100.
(c) United States dollar figures have been adjusted to Canadian dollars.

Source: Statistics Canada; U.S. Department of Commerce.

Productivity

Whether the currently somewhat higher average hourly labour cost in the Canadian industry causes the unit labour cost of Canadian computing equipment to be higher as well depends on the productivity of labour. Labour productivity is ideally measured by the number of units of a particular piece of electronic computing equipment that is produced per worker, per hour, per week, or per year. The Board, however, was not able to obtain such information for either the Canadian or the U.S. computing equipment industry, and consequently used value added per employee per year as an indicator of labour productivity.

Value added per employee is probably the best and most commonly used indicator of labour productivity. Due to the virtual impossibility of arriving at satisfactory measurements of the productivity of other factors of production, such as capital and equipment, labour productivity is generally taken as a rough proxy for overall productivity. This approach is further justified by the fact that when "measuring" labour productivity, account is inevitably taken of the contribution made by other determinants of over-all productivity, such as the degree and quality of mechanization, the organization of production, the use of new technologies and management skill.

It should be stressed that the productivity estimates presented here and hence the findings derived from them, are based in many instances on aggregate figures. They conceal, therefore, the relatively good productivity and efficiency levels attained by some firms as well as the poor levels at which other firms may operate. Furthermore, it should be recalled that the office and store machinery industry is not equivalent to the computing equipment industry in Canada but is used here as being most representative of that industry.

Value added per employee in the office and store machinery industry, on a total activity basis, amounted to $15,033 in 1972. Value added per production worker for manufacturing activity only was $20,749. Value added per employee in the U.S. electronic computing equipment industry, based on total activity, was $24,155 in 1972. A figure for value added by manufacturing per production worker could not be calculated for the U.S. industry, although it no doubt would be higher. Despite the lack of comparability, it is evident from the foregoing that manufacturers of computing equipment in Canada are on average at a disadvantage with respect to labour productivity in relation to U.S. manufacturers. In the opinion of the Board a reasonable estimate of this productivity gap would be around 20 per cent.

It appears, therefore, that the advantage of lower hourly earnings for the Canadian industry, in 1972, $4.48 as against $5.71, was apparently offset by lower productivity. Average hourly earnings were some 20 per cent lower, but productivity was also lower, probably by the same amount or more, with the result that the labour cost of producing computer equipment was at that time as high, or even higher, in Canada than in the United States. This appears to have been especially so with respect to the cost of production-related labour; in 1972, hourly earnings for production-related workers were only 5 per cent lower in the Canadian industry (see Table 8.10), an advantage insufficient to compensate for lower productivity. The difference in average hourly earnings for non-production workers was about 30 per cent, an advantage more in line with the difference in value adder per employee.

For reasons explained previously the costs of production-related labour are the more relevant for computing equipment production in Canada than the cost of non-manufacturing labour. The latter refers mostly to the marketing and distribution of imported computing equipment and not to domestically produced equipment, which is almost entirely exported. Furthermore, the advantage in average hourly earnings appears to have diminished since 1972, and may have disappeared for average hourly earnings of production workers. While improvements have, undoubtedly, occurred in average labour productivity in Canada - for instance by the closing down of facilities and operations with below-average productivity - it is unlikely that the productivity gap between the two industries has narrowed sufficiently in order to offset the shrinking advantage in hourly earnings.

Factors Relating to Productivity Differences

Efficiency or productivity at both the establishment and the industry level can be influenced by a number of factors, including establishment size, scale of operations of firms, and degree of specialization and length of production runs. Variations in these characteristics between the computing equipment industries in Canada and the United States affect the competitive position of the two industries with respect to the cost of materials, supplies and parts, labour productivity and the unit cost of labour and unit overhead costs. For example, the larger, more specialized plant, with longer production runs will be able to order individual parts in larger quantities and can frequently command a better price (or lower cost). The same plant will also be able to use its production workers with less loss of time in switching from one product to another and will likely use its production managers more efficiently as well, thus reducing unit labour costs. A larger plant, belonging to a multi-product, multiplant organization will also generally achieve a more efficient utilization of its promotional expenditures, marketing staff, research and development facilities and its general administration and office staff. The Canadian computing equipment industry is, to some extent, at a comparative disadvantage with respect to all these factors.

Most of the 24 Canadian producers of computing equipment manufacture only a small amount of it. The five largest producers accounted for approximately 95 per cent of the value of all computing equipment and parts, at factory cost, produced in 1972. The 19 other firms accounted for the remaining 5 per cent; not one of the latter produced computing equipment valued at more than $850,000.

The estimated average value of shipments of own manufacture of computing equipment by Canadian manufacturers was $8.6 million in 1972. The 24 manufacturers produced this equipment in 26 different establishments so that average value of shipments of computing equipment per establishment amounted to nearly $7.9 million. As illustrated in Table 8.11, the average value of shipments, f.o.b. plant, per establishment in the U.S. electronic computing equipment industry, was $10.8 million. While the two figures of $7.9 and $10.8 million are not strictly comparable,(1) it is likely that the scale of computer equipment production in most plants in Canada is smaller than in the United States.

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(1) The U.S. average includes shipments of goods other than computing equipment, which could not be broken out, and is valued at f.o.b. plant rather than at factory cost; adjustment for both these factors would lower the U.S. figure substantially, but would probably still be higher than the average for the Canadian industry.

While the smaller production of computing equipment in Canada has, undoubtedly, an adverse impact on production costs, this may be mitigated somewhat by the fact that many Canadian producers combine the production of computing equipment with the manufacture of other commodities, mostly electronic and electro-mechanical. The production of goods other than computing equipment, in the same plant, may result in only a marginal improvement in the factory cost of producing computing equipment but will effect savings in the unit cost of overhead.

Table 8.11: Average Size of Plant by Number of Employees and Value of Shipments for the Computing Equipment Producers in Canada and the Electronic Computing Equipment Industry in the United States, 1972

	Computers and Related Telecommunications Equipment, Parts, Components and Subassemblies, Canada	Electronic Computing Equipment, United States
Total number of employees	11,400	144,800
Number of establishments	26 [a]	601
Average number of employees per plant	438	241
Number of production workers	3,100	64,700
Average number of production workers per establishment	119	108
Value of shipments, manufacturing activity	206.4 [b]	6,471.2 [c]
Average value of shipments per plant	7.9	10.8

(a) Of the 24 producers, only 2 manufacture computing equipment in more than 1 establishment; both in 2 establishments.
(b) Computing equipment of own manufacture.
(c) Includes computing equipment and goods, other than computing equipment, of own manufacture and purchased for resale.

Source: Tariff Board; U.S. Department of Commerce.

Available data suggest that Canadian computing equipment manufacturers produce a wider range of goods, other than computing equipment, in the same establishment than do U.S. manufacturers. Frequently computing equipment manufacturing is not even the primary activity; this is so, for example, with Canadian General Electric and Northern Telecom. Comparing the office and store machinery industry in Canada with the electronic computing equipment industry in the United States, the average plant size, in terms of value of shipments - total activity basis - is very similar, $11.2 million as against $10.8

million respectively. Unit costs of producing computing equipment in Canada and the United States, while higher in Canada, may not differ by as much as the difference in the scale of computing equipment production between the two industries would suggest.

Size of firms, rather than size of plant, is another factor which can have a significant effect on costs of production. The resources available for market development are directly related to the total volume of sales of all products from all of a firm's establishments. The same is true for the scope and depth of a firm's research and development effort. A large corporation generally has more resources to finance accounts receivable and to expand capacity than a small firm, or can obtain financing more easily and on better terms.

Differences in the overall size of the firms that produce computing equipment, however, affect the comparison between the Canadian and U.S. industry very little because most of the computing equipment produced in Canada is manufactured by subsidiaries of U.S. corporations which would normally provide the Canadian plants with the same access to corporate resources as their U.S. plants. Small independent Canadian-owned producers of computing equipment, lacking comparable financial resources for marketing and promotion, research and development, and working capital, are at a considerable disadvantage in this respect, even though they share in financial assistance by governments.

The Board was unable to obtain quantitative information relating to differences in the degree of specialization and length of production runs. While many producers in the Canadian industry manufacture not only computing equipment but also other goods, these are often based on a similar technology or require similar assembly techniques and skills. Nine of the 26 establishments concentrate on computing equipment only. Of the 26 establishments producing computing equipment, 21 are specialized in either mainframes, peripherals, related telecommunications equipment or subassemblies. It is believed that the 601 establishments in the U.S. electronic computing equipment industry are similarly distributed.

Overall Unit Costs of Production

The Board's analysis suggests that the cost structure of companies producing computing equipment in Canada, on average, consists of some 63 per cent of materials, supplies, parts, components and subassemblies, 15 per cent, labour and 22 per cent, overhead costs. It was found that the cost of materials and parts for Canadian computing equipment producers was not much higher than for United States producers because the Canadian industry imported more than 80 per cent of its inputs and received drawback of well over 90 per cent of the duties paid on these imports.

Hourly earnings per production worker were, in 1972, somewhat lower in the Canadian than in the U.S. computing equipment industry but are now probably equal. To the lack of any clear advantage in the average hourly cost of labour for Canadian computing

equipment producers must be added the probable disadvantage in labour productivity, so that unit labour costs are probably higher for the Canadian industry.

Overhead costs per unit of computing equipment are higher for the Canadian industry, but not by as much as might be expected from the relative size of the Canadian computing equipment industry and the relatively small average volume of computing equipment produced per establishment. Most of the equipment is produced in multiproduct plants which are fairly comparable in size and which benefit from international rationalization and specialization by their parent companies. They also have access to the large financial and technical resources of these companies on the same basis as their U.S. sister plants. Considering these cost factors together, the overall unit cost of producing computer equipment is, on average, probably 5 to 10 per cent higher in Canada than in the United States.

It should be stressed at this point that the comparison is essentially between two industries and not between individual firms comprising the two industries. The finding that unit costs of production are, on average, similar between the two industries means that the small-volume producer in Canada is not at a disadvantage with a large-volume producer of the same or a competitive product in the United States or in Canada. Rather, it suggests that a small Canadian manufacturer, serving a very specific, specialized market need, is not at a great disadvantage with respect to a U.S. producer of similar size, serving the same market. The largest plants in both Canada and the United States are owned by large U.S.-based multinational enterprises which have rationalized their global production in order to optimize plant efficiency. More significantly, it would indicate that a multinational company could undertake the production of a given economic volume of computing equipment, or subassemblies, for its international market in Canada at no great cost disadvantage over a United States location.

SUMMARY

The Board's analysis of the structure of production costs of computing equipment in Canada in 1972 indicates that materials and parts accounted for about two-thirds of total factory costs, and constituted the major cost category. Factory labour accounted for about one-fifth, and factory overhead comprised the remainder.

In spite of significant differences in the scale of production, the cost structures of Canadian-owned companies and foreign-owned subsidiaries were quite similar. Both groups of companies relied heavily on imported parts, but foreign-owned firms anticipated drawbacks of virtually all duties paid on imported materials and parts, some 98 per cent, as opposed to 88 per cent for Canadian-owned companies. By exporting a very large proportion of their output, and thereby exercising the duty drawback provisions, both groups of companies avoided most of the cost of duties on imported materials and parts. The net duties paid were also not significant in total factory costs of production when considered by product group.

In 1972, the average Canadian content of computing equipment production was about 45 per cent. By product group, however, the averages ranged from 43 to 59 per cent, and for particular products the range of Canadian content was even wider, from 20 to 99 per cent.

Average hourly earnings in 1972 for production workers were somewhat lower in the Canadian than in the U.S. industry, but are now believed to be about the same. To the lack of any clear advantage for Canadian producers in the cost of labour must be added the probable disadvantage of lower labour productivity. Unit labour costs, as a result, are somewhat higher for the Canadian industry.

Unit overhead costs, on average, are probably also higher for the Canadian industry because of such factors as smaller establishments, scale of production, length of production runs, and degree of specialization. The disadvantage is mitigated to some extent by the diversification of Canadian plants which enables overhead costs to be apportioned to other products as well as computing equipment, and by the access of Canadian subsidiaries to the resources of the parent company. Nevertheless, when all cost factors are considered, the overall average unit cost of producing computing equipment in Canada is estimated to be some 5 to 10 per cent higher than in the United States. This cost difference applies to the "average" producer in Canada. Small Canadian-owned producers are probably at a considerably greater cost disadvantage than that indicated, while the cost differences with respect to the larger subsidiaries of foreign-owned firms are probably small or inconsequential when compared with their parent company plants.

CHAPTER IX: MARKETING PRACTICES AND COMPARATIVE PRICING

CHAPTER IX: MARKETING PRACTICES AND COMPARATIVE PRICING

This chapter begins with a description of the marketing methods and practices employed by suppliers of computing equipment in Canada. It then examines the factors - customs duty, federal sales tax, miscellaneous costs and provincial taxes - which account for the higher retail cost to the user of computer systems in Canada than in the United States, and analyzes the significance of these factors for the various sizes of computer systems and for selected product groups. The difference in the retail cost of computer systems between the two countries is also analyzed for a number of individual suppliers; finally, the incidence of the higher retail cost of computing equipment is discussed with respect to 13 groups of users of this equipment. The chapter concludes with a brief summary.

MARKETING METHODS AND PRACTICES

Suppliers of computing equipment either sell their equipment or rent it. They sell or rent directly to the user or sell to a leasing organization, which in turn leases the equipment to the user. The user, therefore, can purchase, rent or lease an in-house computer system. The term rent refers to a contract, entered into between an end-user and a computer manufacturer or his subsidiary or agent, to pay a fixed amount of money per month for use of the equipment during a specific period of time. A lease differs from a rental contract because a lease is entered into between an end-user and an equipment leasing organization which has no direct link with the manufacturer.

In Canada in 1972, about two thirds of all computer systems installed, in terms of value, were rented. In the United States by comparison, in 1973, 43 per cent[(1)] of the value of computer installations was rented. In recent years, both in Canada and the United States, the proportion rented has tended to decline. The main factor accounting for this change is the increasing proportion of small and relatively inexpensive computer systems which are usually purchased.

The Board estimates that leasing company installations accounted for about 10 per cent of the value of computer systems in Canada in 1972; in the United States, the comparable figure for 1973 was 21 per cent.[(2)] Lessors acquire computer systems by purchasing them from manufacturers, and attract customers by offering lower rental rates than manufacturers. They are able to do this because they amortize their computer systems over a longer period of time than manufacturers, a minimum of seven years compared with four years for manufacturers.

Outright purchases accounted for about 25 per cent of the value of all computer systems installed in Canada in 1972. By comparison, in the United States in 1973, 36 per cent[(3)] of the total value of computer systems installed was purchased. The proportion of the total value of all computer system installations which was

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(1) EDP Industry Report, International Data Corporation, Newtonville, Massachusetts, April 19, 1974, p. 6.
(2) ibid.
(3) ibid.

purchased has been increasing because of the widening demand for small inexpensive computer systems. Occasionally, users purchase systems from a third party, for example, from a lessor at the end of the lease period, or a system previously installed elsewhere from a broker.(1) As far as can be determined, only a very small number of the computer systems installed in Canada were purchased from third parties.

There are advantages and disadvantages for the user in the three methods of acquiring computer systems. Similarly, there are advantages and disadvantages for manufacturers in renting or selling this equipment. These are discussed below, first from the viewpoint of the user, and then from the viewpoint of the manufacturer.

Renting provides several advantages over purchasing. Renting involves a significantly lower initial financial commitment. In addition, it provides greater flexibility. When the computer system proves inadequate for the job, equipment changes can be made or, failing satisfaction, the system can be returned at the end of the contractual period. Furthermore, renting avoids the risk of obsolescence. If a newer computer system is marketed which provides a better cost-performance ratio than existing systems, it will be less expensive for the user of the rental system to change if he rents, or leases, rather than if he owns the system, an important consideration for equipment noted for its rapid rate of technological change and innovation.

Leasing provides the user with advantages over purchasing similar to those noted above for renting. In addition, leasing is less costly than renting. Leasing companies, with longer write-off periods, normally charge users less for the same system than the rental rates of manufacturers.

The duration of a rental or lease contract has a considerable, and to some extent an offsetting, impact on the above advantages of lower cost, greater flexibility and avoidance of obsolescence. For example, the shorter the contractual period is, the greater is the flexibility to the user and the greater is the possibility of avoiding obsolescence; but the cost advantage is reduced because the rental rates are higher for shorter term contracts. And conversely, a long-term contract, while involving lower rental or lease costs, provides less flexibility and less protection against obsolescence. The major disadvantage of renting or leasing is that the total charges for a long-term contract may well exceed the initial price of purchasing the equipment outright.

The decision by a user to purchase a computer system rather than rent or lease one is influenced by a number of factors. Perhaps the most important is the availability of funds. Small, inexpensive computer systems are often purchased because the cash outlay for many firms is relatively minor. It is with the larger, higher priced systems where the decision to rent, lease or purchase becomes significant. Purchasing is advantageous when the basic operations to be

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(1) Very few firms seem to consider purchasing used equipment, perhaps because of the constantly improving price performance ratio of new systems.

controlled by electronic data processing are relatively stable. If the user is confident that he will be operating a given computer system for a period of five years or more,(1) then he could decide to purchase. Purchasing may also be preferable to leasing when the risk of obsolescence is smallest, namely soon after a new system has come on the market. When a long useful life for a system appears likely, the purchase price will be significantly lower than the cumulative rental or lease payments, despite the high initial outlay.

From the manufacturer's point of view, the question of renting as against selling(2) is a complex matter which depends on several factors that vary among manufacturers. One very important consideration is cash flow. The major advantage of selling over renting is that it provides an immediate cash return, which is important for firms which need the cash to pay current expenses. However, this must be balanced against a steady cash flow over a number of years from renting. Renting also tends to broaden the market for computer systems by lowering the initial acquisition cost for users, thus making it possible for some users, who would be unable to do so otherwise, to acquire a computer system. This not only increases the number of current installations, with the attendant economies of a larger volume of production, but also future installations; because once a manufacturer has placed a computer system with a customer, he has a significant advantage over his competitors. Since he is constantly in touch with the user, providing maintenance and technical assistance, he is in a position to recommend a new system when one is required. Experience in the industry has shown that users are reluctant to change manufacturers, partly because of this continuous close contact, and partly because of the additional cost of re-programming the system of another manufacturer. The major disadvantage of renting, compared to selling, is that the manufacturer has a large amount of money tied up in rented equipment. This frequently results in insufficient working capital, a problem that becomes more acute as the proportion of rentals to sales increases.

Terms and Conditions

When a computer system is acquired by a user, a number of contractual arrangements are entered into with the supplier. These arrangements are referred to in this section as the terms and conditions associated with renting, leasing or purchasing computer systems. For purposes of discussion, the terms and conditions can be conveniently divided into four categories, namely, those that relate to hardware, software, services and special arrangements.

The terms and conditions described below are those offered by suppliers of computer systems in Canada in 1972-73. Earlier chapters indicate the dynamic nature of the computer industry in terms

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(1) Manufacturers usually set rental payments for computer systems so that they will equal the purchase price within four years. Other things being equal, it would be cheaper for a user to purchase than to rent the same system, if the equipment requirements are unlikely to change over the long term.

(2) It will be recalled that computer systems that are leased to users are purchased from manufacturers by leasing companies.

of technology and production and, as might be expected, contractual arrangements affecting the rental, lease or purchase of computer systems can change quite rapidly to meet new conditions. The Board believes, however, that the summary of terms and conditions which follows provides an accurate picture of the contractual arrangements currently being followed by the computer industry in Canada.

The terms and conditions offered in Canada by suppliers of computer systems are largely identical to those offered by the same suppliers in the United States. This is not surprising because almost all computer systems installed in Canada are supplied by subsidiaries or agents of U.S. manufacturers. While a number of small differences exist, there remains a great deal of similarity in the terms and conditions which are offered by various suppliers. Each firm tries to counter the moves of its rivals by minor adjustments of its own policies and practices.

Hardware

Users who rent computer systems enter into a contract with the supplier which specifies the amount of the monthly payments, the term of the agreement and the conditions under which the contract may be terminated. The monthly payment is determined by the price of the system and the length of the term of the agreement.

Manufacturers offer contracts for periods of one to five years. In a contract of more than one year's duration, the user is offered a reduction in rent below the one-year rate. The longer the term, the greater the reduction in the monthly rental. The rent on a five-year agreement may be 25 per cent below the one-year rate.

Certain manufacturers permit unlimited use of their computer systems with regard to the term of the rental contract, and most manufacturers permit unlimited usage where the rental agreement is for two or more years. A few manufacturers, however, require the user to pay extra charges for use beyond a stipulated number of hours. This applies particularly to rental contracts for a single year in which the normal usage allowance ranges from 176 to 250 hours per month. The premium charged for use beyond these figures is usually 10 per cent of the monthly rent calculated on an hourly basis.

The rental agreement can be terminated by either party at any time provided three months' notice is given. However, penalty clauses are included in rental agreements of more than one year's duration, and a user may be liable for certain contract termination charges. These charges do not normally apply if the user signs a new rental contract with the same manufacturer for a computer system of equal or greater value.

Users who lease computer systems are subject to terms and conditions similar to those who rent. However, lease contracts are usually signed for a longer period of time than rental contracts and generally provide for unlimited use of the equipment. Basically, there are two types of leases, a full payout lease and an operating lease. The full payout lease usually involves a commitment approximating the economic life of the equipment, generally seven to ten

years. Under it the lessor hopes to recover the full cost of the computer system plus interest, and an amount of profit. At the end of the contractual period, the user can purchase the system at "fair market value" or continue to lease it at a nominal rate. The other type of lease, an operating lease, is usually for a shorter period of time than a full payout lease. Under it the lessor does not expect to recover the full cost of the computer system plus interest on the initial contract, but expects to be able to extend the original lease or re-market the system, in whole or in part.

Most rental and lease agreements provide the user with an option to purchase the rented or leased equipment. This enables them to apply a portion of past rental payments as a credit towards the purchase price. The proportion of past payments which is credited varies from supplier to supplier, but usually increases in relation to the period for which the system was rented. The purchase price, depending on the supplier and the contractual arrangements entered into, may be the price in effect when the equipment was installed or at some later date. Most suppliers allow the user to exercise the option to purchase anytime after installation.

When a manufacturer sells a computer system or an individual device, there are no contractual obligations of the kind discussed above with respect to renting or leasing. There are some marketing practices, however, which relate generally to purchased systems such as quantity discounts and trade-in allowances. Not all suppliers grant quantity discounts; no data are available as to the extent to which computer systems (or devices) are sold by manufacturers at a discount in Canada. At the wholesale level, quantity discounts occur on small inexpensive systems which are purchased in large quantities by firms manufacturing equipment which uses a computer as an integral component, for example, in some types of control or navigation equipment. At the retail level, discounts on individual computer devices probably also occur on large orders such as terminals purchased by banks or airline companies.(1)

At least one supplier offers a discount off regular price to customers who have the necessary technical staff and other support services normally provided by the supplier. Such an arrangement is attractive to service bureaux and other organizations which have the technical expertise to provide their own services.

Suppliers usually provide for a trade-in allowance on old equipment towards the acquisition of a new system. The amount of this allowance varies depending on the supplier and the system; it is generally determined by estimating the market value of the system to be traded at the date of the trade-in. Some suppliers limit the trade-in allowance to a percentage of the purchase price of the new system being purchased. The trade-in allowance is normally given by the supplier in the form of a discount from the list price of the new system.

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(1) Quantity discounts probably also occur on large orders of rented equipment.

Software

Whether the user rents, leases or purchases his computer system, there is usually a contractual arrangement with the supplier to provide certain software. The type and quantity of software provided by the supplier varies, depending on the supplier and the contractual arrangements that were entered into.

Software can be described as consisting of two types. The first type includes computer operating systems software, which controls the operation of the computer system and manages the tasks that are performed by it; software compilers, which translate programs into machine language; software assemblers, which organize programs written in quasi-machine language; and various utility programs and routines, which permit large quantities of data to be manipulated more easily. This first type of software is normally produced by the manufacturer of the computer system, and is made available to the user on a magnetic tape or disk when the system is acquired. The cost of this software is usually included in the price of the hardware.

The second type of software is the applications programs that perform specific tasks on the computer system for the user. Applications programs are most often written by users to suit the particular circumstances that apply to their organizations. They are also produced by manufacturers and software houses for sale or rental to users as generalized solutions to particular tasks, such as payroll or inventory control. Although some manufacturers may still provide applications software packages free of charge, most have "unbundled" them from their hardware, and separate agreements are drawn up concerning the use of manufacturers' applications software.

Some applications programs can be purchased but most are acquired by users under licence, usually for a period of one year. Suppliers may also offer agreements of up to five years at rates below those for a one-year agreement. The licensing agreement may stipulate an initial acquisition charge plus a monthly fee, or a monthly fee only, and it can be terminated by either party on 30 to 90 days notice, depending on the supplier. The agreement usually restricts the use of the program to a specified central processor and forbids the user to copy the program or associated materials.

Suppliers have found that the availability of a large number and variety of applications programs will facilitate the marketing of their computer systems. From the user's point of view, the existence of programs which can be readily applied to the solution of his problems may be the deciding factor in determining whether or not one computer system is chosen in preference to another.

Services

Computer systems suppliers provide a variety of services which are available, usually for a fee, to users of rented, leased or purchased equipment.

Most suppliers offer maintenance agreements to users of rented, leased or purchased systems which cover preventive and remedial maintenance. On rented or leased systems, the supplier provides the maintenance, usually through his own staff but sometimes through an arrangement with an independent firm. For such systems, the cost of maintenance is usually included by the supplier in the rental fee charged to the user. Even if the maintenance charge is separate from the rental fee, the user has no option but to enter into a maintenance agreement with the supplier and pay the stipulated charges. On purchased systems, the owner has the option of having the maintenance done by the supplier, by another firm or by his own staff.(1) He can usually terminate the contract, without penalty, by giving from 30 to 90 days notice, depending on the supplier.

Maintenance fees are set for each unit of equipment. In general, maintenance fees for electronic devices such as the central processing unit and main memory are lower as a proportion of the purchase price, or monthly rental, than are charges for electro-mechanical devices such as printers and card readers which are subject to higher failure rates.

A wide variety of technical assistance is also available to users. Some of it is free but most of it is available for a fee. The amount of free assistance depends on the value of the system, the supplier, and the contractual arrangements that have been entered into. Technical assistance in the form of educational courses is usually charged for separately. It includes short general courses for executives and detailed programming and other courses for the operational staff. Additional technical assistance is available in the form of systems engineers and programmers who can supplement and advise the user's staff.

Suppliers also provide technical manuals on the operation of the system. Prior to installation of the computer system at the user's premises, pre-tests of the user's applications programs can be undertaken at the manufacturer's service centre. This may or may not be the subject of a fee, depending on contractual arrangements. Occasionally, where rented systems are concerned, monthly payments may be deferred by mutual agreement for a period of up to six months after initial installation, in recognition of the potential or actual lack of useful output in the initial stages of applying the computer.

(1) For equipment that has been purchased from third parties - a used computer broker or user - maintenance is available from most manufacturers on the same terms as those which are offered to first owners of similar equipment. There is no discrimination in maintenance fees charged, provided the particular equipment has been kept in good repair and its condition has been verified by the manufacturer. If it is judged by the manufacturer to be in need of repair, a complete overhaul is done to restore it to the required condition.

Special Arrangements

There are some special contractual arrangements, other than those discussed above, under the terms and conditions relating to hardware, software and services. One concerns the special arrangements which apply to educational institutions with respect to hardware, software and service.

Most suppliers have special arrangements for educational institutions. They grant them discounts from regular commercial rates on hardware - whether rented or purchased - and on software and maintenance. The size of the educational discount varies from supplier to supplier and depends on the kind of equipment and services being acquired. In general, suppliers grant at least 5 per cent discount for some equipment and services; but others provide discounts as high as 25 per cent. As noted in Chapter III, equipment for such institutions usually enters under tariff item 69605-1, free of duty and the federal sales tax.

Educational discounts are restricted to most public and private school systems, including community colleges, universities, and publicly supported vocational schools. Such discounts are not granted, for example, to data processing schools which are operated for profit. The Board understands that the equipment must be used exclusively in instruction and for academic research. The time that the equipment is used for other purposes, whether by persons outside or inside the institution is charged for at commercial rates. Suppliers grant discounts to educational institutions because it encourages the use of computers generally, and those of the supplier specifically, and assists with the development of computer software.

The discussion of retail prices relates mainly to computer systems because most computing equipment is acquired by users in the form of a system, not as separate units. It is important to note that prices of computer systems at the retail level involve more than hardware. They also cover hardware installation, certain types of software, marketing, support services and duties and taxes. In addition, they include an amount that is intended to cover sales promotion, administration and profit. To a large extent, therefore, the purchaser of a computer system is buying a combination or package of products and services. In these circumstances, the terms and conditions of the sale or rental of a computer system take on a great deal of importance because it becomes apparent that both the package and the "price" are, to some extent, negotiable.

DIFFERENCES IN RETAIL PRICES OF COMPUTER SYSTEMS IN CANADA AND IN THE UNITED STATES

The comparison which follows concerns the difference in the cost of purchasing computing equipment as between Canada and the United States. It consists of the difference in retail list prices plus the difference arising from provincial or state and other local taxes. Retail list prices exclude these provincial or state and local taxes, while the final cost to the purchaser includes them. Therefore, this section uses the more inclusive terms such as "purchasing cost" and "retail cost", rather than retail list prices, unless

specifically referred to as such, because the purpose of this section is to examine how much more the Canadian purchaser of computing equipment pays than his counterpart in the United States, and the effect of the tariff on this final cost.

The comparison is based on retail prices and purchasing costs as they existed in the two countries for the period 1972-73. It is believed that, although retail costs have increased since that time, the difference between the two countries has remained essentially unchanged. A comparison between Canada and the United States was the most relative because almost 90 per cent of all computing equipment sold in Canada is imported from that country mostly by U.S. subsidiaries who usually base the retail list price in Canada on those of their parent companies in the United States.

The data were obtained from 10 major domestic suppliers of computing equipment. These suppliers accounted for almost 90 per cent of the total value of computer systems which had been installed in Canada as of the end of May 1972. Most of the suppliers who responded to the Board's request for price data provided fairly detailed information. As a result, the Board was able to assess the significance of duty, federal sales tax, miscellaneous costs and provincial taxes for computer systems as well as for some individual devices comprising these systems. No adjustment was made for the difference in exchange rates between the Canadian and U.S. dollar. However, during the period for which retail prices applied, the average annual spot rate of the Canadian dollar was within 1 per cent of parity with the U.S. dollar.

The comparisons in this section have been made on the basis of selling prices of computer systems in the United States and in Canada, rather than on rental or leasing prices in the two countries. Not only was it much easier to use selling prices, but suppliers have advised the Board that comparisons of rental or leasing prices would have produced the same results because the three types of prices generally bear a constant relationship. Moreover, selling prices are generally established prior to the setting of rental prices, and leasing prices are derived from the prices at which equipment is sold by the manufacturer to equipment leasing companies.

The discussion in this section is concerned with the 70 per cent of the installed computing equipment which is subject to the duty, the federal sales tax or provincial sales taxes. Computing equipment acquired by various levels of government, federal, provincial and municipal, and by educational and some other kinds of organizations are exempt from some or all of the above taxes. The Board estimates that this involves about 30 per cent of the value of all computer systems installed in Canada.

The data collected by the Board show that, on average, the purchase cost of computer systems in Canada was about 18 per cent higher than that of computer systems in the United States. When various sizes of computer systems are considered, the differentials

ranged, on average, from 14 per cent on very small systems[(1)] to 21 per cent on small systems. For the suppliers who provided information to the Board, systems sold in Canada would cost Canadian users from 13 per cent to 26 per cent more than those sold by these same suppliers in the United States.

Factors Accounting for Price Differences

As the bulk of the computing equipment sold in Canada is imported from the United States by subsidiaries of manufacturers, retail prices in Canada are generally arrived at by adding an amount to U.S. list prices to cover all additional expenses incurred in marketing the systems in Canada. These expenses comprise the cost of the duty and the federal sales tax, and miscellaneous marketing expenses. The Canadian purchaser usually must pay a provincial sales tax, which is often higher than state or local taxes paid in the United States. The average impact of each of these factors on the final cost to the Canadian purchaser of computer systems is shown in Table 9.1.

The first factor that increases the cost of computing equipment to the Canadian user is the duty. The average rate of duty paid on a computer system is determined by the rates of duty applicable to the individual devices making up the system; the rates on these devices may range from Free to 25 p.c. According to data obtained by the Board, the average rate of duty paid on the computer systems covered was 8.6 p.c. of the value for duty of these systems.[(2)] However, this value for duty was only 42.5 per cent of total retail cost in the United States, and therefore, the effect of the duty at that level was only 3.6 p.c., see Table 9.1. Because the cost of the average computer system to the Canadian purchaser is higher than in the United States, 118 as against 100, as shown in Table 9.1, the impact of the duty on the Canadian purchaser is even less, 3.1 per cent.[(3)] It is clear, therefore, that the cost of the duty is but a small part of the Canadian retail price.

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(1) The Board used the following size classifications:

Size	List Price $'000
Very small	less than 100
Small	101-225
Medium	226-450
Large	451-900
Very large	over 900

(2) This compares very favourably with the 8.8 p.c. on actual imports of computing equipment during the 2-month period of 1971.

(3) At the public sittings, the representative for IBM indicated that the elimination of customs duty would cause a reduction of about four per cent in list prices of computer systems in Canada. (Transcript, Volume III, p. 326). The calculation by the Board, based on retail prices, compares favourably with the estimate by IBM, when account is taken of the fact that elimination of customs duty would also result in a reduction of federal and provincial sales tax costs because they are levied on the duty-paid value of goods.

The federal sales tax is another factor which, since there is no equivalent tax in the United States, raises the Canadian retail list price and purchase cost of the average computer system above that in the United States. This tax is levied at a rate of 12 p.c. against the duty-paid value of imported goods. As shown in Table 9.1, the federal sales tax added 5.5 percentage points to final purchase cost in the United States. Of this amount, 0.4 percentage points represents the levy of the federal sales tax on the duty paid, and the other 5.1 percentage points, the cost of the sales tax with respect to the value for duty. The total cost of the sales tax is, therefore, enhanced by the import duty.

Table 9.1: Significance of Customs Duty, Federal Sales Tax, Miscellaneous Costs and Provincial Sales Taxes in Accounting for Higher Retail Cost for Computer Systems in Canada[(a)] than in the United States, 1972-1973

	Computer Systems	
	Sold in the United States	Sold in Canada
U.S. list price	95.7	95.7
Customs duty	0.0	3.6
Federal sales tax	0.0	5.5
Miscellaneous costs[(b)]	0.0	6.1
Sub-total	95.7	110.9
Local taxes[(c)]	4.3	7.2
Retail cost	100.0	118.1

(a) According to suppliers, retail prices in Canada are based on list prices in the United States plus various mark-ups to cover additional costs.
(b) This is a residual figure. It is the difference between list prices in Canada and list prices in the United States after all identifiable factors have been accounted for.
(c) Provincial taxes in Canada are estimated at 6.5 per cent and state and county taxes in the United States at 4.5 per cent of list prices.

Source: Tariff Board.

There are a number of other costs incurred by suppliers when marketing computing equipment in Canada. In total these are the residual costs after the cost of the duty and of the federal sales tax have been subtracted from the overall difference between U.S. and Canadian retail list prices. They include brokerage, transportation, royalties, etc., all of which contribute to the higher retail list price in Canada.

One element of miscellaneous costs, that was specifically referred to by several suppliers, concerned the relatively higher cost of doing business in Canada. This contention is that Canada has a significantly smaller number of users per supplier location than has the United States. Each of these locations, whether in Canada or in the United States, must maintain a minimum number of highly trained specialists to deal with a variety of computer systems and a variety of user applications. While the costs of these highly trained specialists are probably just as high in Canada as they are in the United States, the number of computer systems and users served from the average Canadian location is lower than in the United States. This results in relatively higher marketing costs and hence in higher retail list prices per unit for computing equipment in Canada. Data obtained by the Board indicate that these miscellaneous costs added an average of 6.1 per cent to the purchase cost of computer systems in Canada compared with those in the United States. Such costs were, therefore, on average, of greater significance than either duty or federal sales tax.

Thus far, this section has considered the factors which account for the difference between retail list prices. Provincial sales taxes, however, also increase the cost of computing equipment to the Canadian purchaser. In Canada, all provinces except Alberta levy a sales tax on goods sold within their jurisdictions. The taxes are levied as a proportion of the retail price of the goods and vary by province from 5 per cent to 8 per cent. The Board estimates that the average rate of provincial taxes levied on computing equipment in Canada in 1972-73 was about 6.5 per cent,(1) equivalent to 7.2 percentage points in Table 9.1.

The provincial sales taxes, however, have their counterparts in state, county and municipal sales taxes in the United States. Many states levy sales taxes, varying from 2 to 6 per cent on the retail price of goods. In addition, some counties and cities also levy sales or personal property taxes, usually about 2 per cent of retail price. The Board has estimated that the average rate of state and other local taxes levied in the United States in 1972-73 was about 4.5 per cent, equivalent to 4.3 percentage points in Table 9.1. It would appear, therefore, that the effect of state and local taxes on the cost of computer systems to U.S. purchasers is less than that of provincial sales taxes in Canada. The difference makes the final cost to the purchaser of an average computer system in Canada 2.9 per cent higher than in the United States. This does, moreover, not allow for the fact that, in the United States, the user can deduct the cost of local taxes paid when he calculates his federal income tax. This advantage is not directly available to the Canadian user of computer systems.

The duty also increases the cost of the provincial sales tax to the Canadian purchaser of computing equipment, because these taxes are levied against the retail price which includes the duty, and the federal sales tax on the duty. The amount by which the provincial sales taxes are increased as a result of the duty is estimated, according to the model of Table 9.1, at 0.3 percentage points. As illustrated

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(1) This figure is based on the proportion of the value of computer systems installed in each province, see Chapter IV.

in Table 9.2, the combined, direct and indirect, cost of the duty added 4.3 per cent to the U.S. retail cost and comprised 3.7 per cent of the Canadian retail cost. In other words, without a duty, the average computer system would cost the Canadian user 3.7 per cent less.

Table 9.2: Direct and Indirect Impact of the Duty on the Purchase Cost of a Computer System

	Basis U.S. Purchase Cost		Basis Canadian Purchase Cost	
Purchase cost		100.0 (a)		118.1 (a)
Customs duty	3.6%		3.10%	
Federal sales tax on duty (12% of customs duty)	0.4%		0.37%	
Provincial sales tax (6.5% of [3.6 plus 0.4%])	0.3%		0.22%	
Total	4.3%		3.69%	

(a) From Table 9.1.

Source: Tariff Board.

Overall, the Canadian purchaser of an average computer system would tend to pay 18 per cent more than the U.S. purchaser of the same equipment. This difference comprises the direct cost of the duty, 3.6 per cent; the federal sales tax, 5.5 per cent; miscellaneous costs, 6.1 per cent; and provincial sales tax, 2.9 per cent. As explained earlier, the cost of the duty, direct and indirect, raises the cost to the Canadian purchaser by 4.3 per cent over that in the United States.

By Size of System

The cost to the purchaser in Canada, as shown in Table 9.3, was, on average, 14.4 per cent greater than in the United States for very small systems, 17.8 per cent for very large systems, 19.4 per cent for medium-sized systems and 20.9 per cent for small systems. Of the 22 systems of various sizes included in the Board's survey, there was not one for which the purchase cost in Canada was lower than that in the United States.

For most of the size groupings, the federal sales tax contributed more than the other factors to higher prices in Canada. The duty raised the cost to the Canadian purchaser by an amount ranging from 5.1 per cent for the very small systems to 3.3 for the very large ones. It can be seen that the effect of the duty and the federal sales tax diminished as the system increased in size. This is due to the fact that the value for duty as a percentage of the retail price is lower for large systems than for small systems - 38.1 per cent for the very large systems as against 64.1 per cent for the very small.

The methods by which the value for duty of computing equipment is determined have been discussed at length in Chapter III. As a result of the different methods, it appears that firms supplying very small computer systems were more frequently assessed a value for duty based on list price in the country of origin (usually the United States) less a discount. Suppliers of very large computer systems were mostly assessed a value for duty based on cost of manufacture plus a mark-up. The latter assessment results in a lower proportion of retail price being liable for duty and federal sales tax than the alternative method based on a discount from list price in the country of origin. This occurs because the cost of manufacture relates to the cost of hardware only, and does not include software, services, profits and other factors which are included when the assessment is based on the list price. The cost of hardware represents a relatively small proportion of the retail price; it is believed to vary from 20 to 40 per cent depending on the equipment.

Table 9.3: Significance of Customs Duty, Federal Sales Tax, Miscellaneous Costs and Provincial Sales Taxes in the Higher Retail Cost of Computer Systems in Canada than in the United States, by Size of Computer System, 1972-1973

	Retail Cost			Factors Accounting for Difference				
Size of Computer Systems[a]	Value for Duty	In Canada[b]	In the United States	Diff.	Duty	Federal Sales Tax	Miscel- laneous Costs[c]	Difference Between Canadian Provincial and U.S. State & Local Taxes[d]
Very small	64.1	114.4	100.0	14.4	5.1	8.5	-1.8	2.6
Small	54.8	120.9	100.0	20.9	4.2	7.1	6.5	3.1
Medium	50.7	119.4	100.0	19.4	4.2	6.7	5.5	3.0
Large[e]	..	..	100.0	..	..	..	..	..
Very large	38.1	117.8	100.0	17.8	3.3	4.9	6.6	2.9
All systems	42.5	118.1	100.0	18.1	3.6	5.5	6.1	2.9

(a) The classification of computer by size is shown on p. 276.
(b) According to suppliers, retail prices in Canada are based on list prices in the United States, plus various mark-ups to cover additional costs in Canada.
(c) This is a residual figure. It is the difference between list prices in Canada and list prices in the United States after duty and federal sales tax have been accounted for.
(d) Provincial taxes are estimated at 6.5 per cent and state and local taxes at 4.5 per cent of list prices.
(e) Only 2 systems out of the sample of 22 fell into this category. The Board considered that they were unrepresentative of the group.

Source: Tariff Board.

On very large-sized systems, miscellaneous costs added 6.6 per cent to Canadian prices over those in the United States, a higher proportion than for any other size group. On very small systems, the Canadian retail price did not even allow for full recovery of duty and federal sales tax, not to mention other marketing costs. It appears that for the very small systems, where competition is extremely keen, the Canadian sales are less profitable than sales in the United States. Provincial sales taxes are estimated to add from 2.6 to 3.1 per cent to the cost of purchasing a computer system in Canada.

By Product Group

So far, the analysis of retail costs has dealt with computer systems only. This emphasis on systems is related to the fact that suppliers primarily market computer systems. However, they also market units of equipment that make up computer systems, usually to customers who want to extend the capability of their present system. Although such activity is of secondary importance compared to the marketing of complete systems, the tariff classification of various units to different tariff items, at rates of duty ranging from Free to 25 p.c., means that the impact of the duty and the federal sales tax on the retail cost of these units, frequently varies. Because some suppliers provided the Board with less product detail than others, it was possible to examine only six product groups; central processing units, printer units, magnetic tape units, card units, disk and drum units, and display units.

The cost to the Canadian purchaser of these kinds of computing equipment was higher than in the United States by an amount ranging from 15 per cent for disk and drum units to 24 per cent for display units, as shown in Table 9.4. The federal sales tax, together with other marketing costs incurred by suppliers in the Canadian market, accounted for most of this difference, which ranged from 10.4 to 12.9 percentage points. Most of the variations in price differentials between the groups, however, were caused by variations in the relative cost of the duty; it added 7.9 per cent to the U.S. purchase cost of display units, but only 0.9 per cent to that of disk and drum units. Incidence of the duty was also low for card units, 1.6 per cent per unit. The relative insignificance of the duty for these products was due to the remission of duties for some of the units surveyed under tariff item 42700-1.

Table 9.4: Significance of Customs Duty, Federal Sales Tax, Miscellaneous Costs and Provincial Sales Tax in the Higher Retail Costs of Selected Groups of Computing Equipment in Canada than in the United States, 1972-1973

	Retail Cost			Factors Accounting for Difference			
Groups of Computing Equipment	In Canada[a]	In the United States	Diff.	Duty	Federal Sales Tax	Miscel-laneous Costs[b]	Difference Between Canadian Provincial and U.S. State & Local Taxes[c]
Central processing units	118.0	100.0	18.0	3.8	5.0	6.4	2.9
Printer units	118.1	100.0	18.1	3.5	6.6	5.1	2.9
Magnetic tape units	120.4	100.0	20.4	6.8	6.9	3.6	3.1
Card units	117.4	100.0	17.4	1.6	6.8	6.1	2.9
Disk and drum units	115.1	100.0	15.1	0.9	5.8	5.7	2.7
Display units	124.0	100.0	24.0	7.9	6.7	6.1	3.3
Total	118.1	100.0	18.1	3.6	5.5	6.1	2.9

(a) According to suppliers, retail prices in Canada are based on list prices in the United States, plus various mark-ups to cover additional costs in Canada.
(b) This is a residual figure. It is the difference between list prices in Canada and list prices in the United States after account has been taken of duty and federal sales tax.
(c) Provincial taxes are estimated at 6.5 per cent and state and local taxes at 4.5 per cent of retail prices.

Source: Tariff Board.

By Supplier

The difference between Canadian and U.S. retail cost for the computer equipment covered by the Board's survey of prices varied, not unexpectedly from supplier to supplier. The equipment supplied by company A, in Table 9.5, cost the Canadian user 25.8 per cent more than the U.S. user. For company B, the difference was only 13.5 per cent. The impact of the duty ranged from a high of 7.4 per cent for company D to a low of 2.3 per cent for company E. The incidence of the federal sales tax was highest for supplier D as well, 10.6 per cent, and was also lowest for company E, 3.2 per cent. The combined effect of the duty and the federal sales tax was to add 18.3 per cent to the U.S. purchase cost for company D, and only 5.5 per cent for company E.

These variations are in part caused by different computing equipment products entering at different rates of duty. However, it appears that they are mostly the result of the application of different valuation for duty rulings. All companies which were assessed a value for duty based on manufacturing cost plus a mark-up had a lower value for duty as a proportion of U.S. list price than companies which had a ruling based on selling price in the country of origin less a discount. As a consequence, the combined burden of duty and federal sales tax was uniformly lower for the former than for the latter group of companies.

In a competitive price situation such advantageous tariff treatment would tend to permit more miscellaneous marketing costs to be recovered and Canadian sales to be more profitable than for the supplier with a heavier duty and tax burden; note that company E had additional miscellaneous marketing costs, including profits, equal to 10.4 per cent of the U.S. purchase cost, while company D, was unable to recover the full cost of the duty and the federal sales tax, and absorbed any additional marketing costs it may have incurred. In general, suppliers with lower value for duty assessments had a larger margin for miscellaneous factors than suppliers with higher value for duty assessments.

Table 9.5: Significance of Customs Duty, Federal Sales Tax, Miscellaneous Costs and Provincial Sales Taxes in the Higher Retail Cost of Computer Systems in Canada than in the United States, by Supplier, 1972-1973

	Purchase Cost			Factors Accounting for Difference			
Supplier	In Canada(a)	In the United States	Diff.	Duty	Federal Sales Tax	Miscellaneous Costs(b)	Difference Between Canadian Provincial and U.S. State & Local Taxes(c)
A	125.8	100.0	25.8	3.2	6.1	13.1	3.4
B	113.5	100.0	13.5	..	..	..	..
C	114.9	100.0	14.9	4.0	6.0	2.1	2.7
D	116.7	100.0	16.7	7.7	10.6	-4.4	2.8
E	118.8	100.0	18.8	2.3	3.2	10.4	2.9
F	117.6	100.0	17.6	5.5	8.7	0.5	2.9
G	119.6	100.0	19.6	5.5	9.4	1.8	2.9
H	118.5	100.0	18.5	3.7	5.1	6.8	2.9
I	114.9	100.0	14.9	4.6	7.6	-	2.7
J	116.5	100.0	16.5	5.9	8.5	-0.7	2.8
All Suppliers	118.1	100.0	18.1	3.6	5.5	6.1	2.9

(a) According to suppliers, retail prices in Canada are based on list prices in the United States plus various mark-ups to cover additional costs.

(b) This is a residual figure. It is the difference between list prices in Canada and list prices in the United States after account has been taken of duty and federal sales tax.

(c) Provincial taxes are estimated at 6.5 per cent and state and local taxes at 4.5 per cent of retail prices.

Source: Tariff Board.

By Industry

In this section, the effect of the higher purchasing cost of computing equipment in Canada on the cost structure of various industries using such equipment is measured. As a first step the Board determined the proportion of total revenues accounted for by computing equipment costs. This proportion was then applied to the difference in purchasing cost between Canada and the United States of all computer systems. The impact of the various factors contributing to the higher purchase cost, including the duty, the federal sales tax, miscellaneous costs and provincial sales taxes are also assessed.

Data on computing equipment costs and total business revenues(1) were obtained by the Board from a number of organizations by means of two special surveys. One survey was sent to service bureaux and the other to business and government organizations. Forty-seven service bureaux and 270 business and government organizations responded to the request for information on their revenues and computing equipment costs. Respondents were classified into 13 broad industrial groups, as indicated in the survey. The data refer to 1972.

As could be expected, computing equipment costs, expressed as a percentage of revenue, were several times larger for the computer services industry at 28.3 per cent than for those of any other industry listed in Table 9.6. The only other industry group for which computing equipment costs exceeded 1 per cent of revenues, or budget, was education at 1.19 per cent. For all other activities, computing equipment costs were less than 1 per cent of their revenues, ranging from 0.64 per cent for printing and publishing to 0.11 per cent for retail and wholesale trade.

The differences in computing equipment costs as a percentage of revenues reflect the nature and significance of computer operations in various industries. For example, in the computer services industry, computing equipment occupies the same role as production equipment in some other industries. It is the equipment used to produce the output of the data processing services which provides most of the revenue. In other industries, computing equipment, although it might be regarded as indispensable, does not take on the same direct importance as it does in the computer services industry.

It is not surprising, therefore, to find that the incidence of the higher cost of acquiring computing equipment in Canada and the impact of the duty is greatest for the computer services industry. The higher average Canadian purchase cost of 18 per cent, shown in Table 9.1, adds to the cost of doing business for this industry in an amount equivalent to 5.1 per cent of total income. The duty increases cost by an amount representing 1.02 per cent of revenue. In all other industries those same costs rarely exceeded 0.1 per cent of revenues. Thus, even a significant change in the rate of duty would appear to have a negligible impact on costs for all industries with the exception of the computer services industry, and even here the effect would be small.

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(1) For government, education, and health and welfare services, budget figures were used instead of revenues.

Table 9.6: The Impact of Customs Duty, Federal Sales Tax, Miscellaneous Costs and Provincial Sales Tax on Computing Equipment Costs as a Percentage of Revenue,[a] by Industry in Canada, 1972

Industry	Computing Equipment Costs[b]	Customs Duty (3.6%)[c]	Federal Sales Tax (5.5%)[c]	Miscellaneous Costs (6.1%)[c]	Difference Between Provincial Taxes in Canada and State/Local Taxes in the United States (2.9%)[c]	Total
			-	% of revenues	-	
Communications	0.37	0.01	0.02	0.02	0.01	0.06
Computer services	28.27	1.02	1.55	1.72	0.82	5.10
Education	1.19	-	-	0.07	-	0.07
Finance, insurance and real estate	0.38	0.01	0.02	0.02	0.01	0.06
Government	0.15	-	-	0.01	-	0.01
Health and welfare services	0.62	-	-	0.04	-	0.04
Manufacturing	0.17	0.01	0.01	0.01	*	0.03
Petroleum	0.22	0.01	0.01	0.01	0.01	0.04
Primary/Resource	0.20	0.01	0.01	0.01	0.01	0.04
Retail and wholesale trade	0.11	*	0.01	0.01	*	0.02
Transportation and storage	0.29	0.01	0.02	0.02	0.01	0.06
Utilities	0.46	0.02	0.02	0.03	0.01	0.09
Printing, publishing and allied industries	0.64	0.02	0.04	0.04	0.02	0.12

(a) Budget figures were used for education, government and health and welfare services.
(b) Includes rent, maintenance costs and depreciation charges.
(c) The significance of these factors was calculated in Table 9.1.

Source: Tariff Board.

Furthermore, as noted in Chapter IV, the cost performance ratio of computing equipment has been improving. That is, more work can be done now for a given cost of computing equipment compared with a few years ago. This downward trend in the relative cost of computer hardware is expected to continue. On the other hand, some other costs of operating a computer installation, for example, personnel costs, the cost of supplies and overhead costs have been increasing. Thus, while total costs of operating computer installations in every industry might be rising, the proportion accounted for by equipment is falling, reducing the incidence of the tariff even further in total costs.

SUMMARY

The average computer system installed in Canada costs the Canadian user 18 per cent more than the same system in the United States. This difference is in part accounted for by the direct cost of the duty, the cost of the federal sales tax, other costs associated with marketing in Canada and higher average provincial taxes, compared to state and local taxes. The effect of the duty paid, and of the federal sales tax, on the purchase cost of computer systems, was greatly reduced because the value for duty, on which both the duty and the federal sales tax are based was only 42.5 per cent of the U.S. retail cost. The average rate of duty paid on the import value of all computer systems covered by the Board survey was 8.6 per cent.

The duty, in addition to increasing the purchasing cost directly, also adds to this cost indirectly by raising the amount of federal sales tax and provincial sales tax payable. This direct and indirect effect combined was equal to 4.3 per cent of the purchase cost of the average computer system in the United States, and raised the cost to the Canadian consumer by 3.7 per cent. The overall impact of the duty on computing equipment, on the Canadian user, therefore, appears to be rather small.

The difference between Canadian and U.S. purchase costs varied by size of computer system from 14.4 per cent to 20.9 per cent. The effect of the duty and the federal sales tax diminished as the size of computer system increased, because the average value for duty, as a proportion of the retail cost, declined correspondingly. More suppliers of small computer systems were assessed a value for duty based on the retail list price in the country of origin less a discount - which normally results in a higher value for duty - and more suppliers of large systems were assessed at value for duty based on cost of manufacture plus a mark-up.

Among suppliers, the difference in retail cost of computer systems between Canada and the United States was as high as 25.8 per cent and as low as 13.5 per cent. The cost of the duty and the federal sales tax combined differed greatly from one supplier to another supplier; it amounted to as little as 5.5 per cent and as much as 18.3 per cent. This variation in effect of the duty and the sales tax was in large part the result of different value for duty rulings.

The effect of the duty, and of the higher purchase cost of computer systems in Canada than the United States, on user industries was greatest for computer service bureaux. In this instance, the higher purchase cost of the average system added about 5 per cent to its total cost of doing business, and the duty about 1 per cent. For other users the impact was much smaller.

CHAPTER X: TARIFF CONSIDERATIONS

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THE CENTRAL ISSUE

Essentially, the Canadian Customs Tariff has no specific provision for computing equipment and parts. This fact is at the core of the problems that have arisen in the classification of finished products and parts for customs purposes. Thus, the central issue to be faced in this Reference is whether there is a need for a new tariff item or items, or whether the status quo or some modification of the status quo would suffice.

The Board has carefully examined the central issue, and has concluded that neither the status quo nor modifications thereto would provide satisfactory solutions. In brief, there are many valid arguments against the continued use of the current tariff treatment, but perhaps the most telling argument is that the status quo is devoid of logic. Although modifications could be made to the present tariff schedule, either by consolidating all computing equipment and parts into an existing tariff item, or by utilizing the seven or eight most frequently used tariff items for this equipment, it is apparent that these would be merely expedients, and would continue to embrace other commodities which have not been examined under this Reference.

The impracticality of retaining either the status quo or modifications thereto, permits no recourse other than the creation of new tariff items in which to classify the equipment and parts under review. The need for new tariff items has been strongly supported by industry, and no company has suggested an alternative approach. The proper accommodation of computing equipment and parts within the Canadian tariff will bestow many benefits, without incurring any significant disadvantages. The chapter proceeds, therefore, on the basis that new tariff items are the only viable solution to the central issue.

The first section of the chapter considers the nomenclature that should be included in a new tariff item for computing equipment and parts. The second section discusses current rates of duty, and examines potential rate structures. The chapter ends with considerations of software and value for duty.

NOMENCLATURE

The need for a new tariff item which encompasses computing equipment and parts carries with it the need for a suitable nomenclature. Several possibilities exist, including the examples of the Brussels Tariff Nomenclature and the Tariff Schedules of the United States, and the proposals by industry. Basically, the choice lies between a broadly-worded tariff item and one in which the terminology is very specific as to each type and unit of equipment. At the same time, it is essential that the nomenclature embrace both systems of equipment and the particular units that constitute such systems. It would also be highly desirable that the nomenclature be capable of accommodating new units of computing equipment upon their introduction.

Specific versus General Nomenclature

A very specific terminology has the advantage of prescribing precisely those systems and units of equipment that are meant to be encompassed. To the degree that the nomenclature is specific, it overcomes the uncertainties surrounding tariff classification. It has been shown that this is a problem where computing equipment is concerned. On the other hand, there are a number of difficulties involved in arriving at a precise listing of equipment. The large and increasing number of products (estimated at 350 or more), the differences in terminology used by the industry, and the rapidly increasing scope of the equipment under review, are but a few of the reasons that make this a difficult task. This is then compounded by the problem of maintaining a current listing; a factor commented upon by EIAC:

> Since the Customs Tariff tends to permanence, with amendments often slow and difficult, it is our view that the present inquiry should aim at a tariff format which will provide its own flexibility to meet changing conditions in the industry, without requiring frequent statutory amendments.(1)

A broad terminology overcomes many of the deficiencies of a very specific nomenclature by its inherent flexibility. Its prime advantage lies in the fact that it would not soon become outdated; provision for new products would be automatic. It could also, of course, be more easily arrived at than a very specific terminology; however, its very generality would make classification of particular units, in questionable instances, difficult.

Most of the proposals made to the Board favour a broadly-defined nomenclature. The existing nomenclatures of the TSUS and the BTN dealing with computing equipment are also broad in scope, although the latter presents a very complete functional description, within its explanatory notes, of the products intended to be encompassed under the heading Automatic Data Processing Machines and Units Thereof, without actually naming the units of equipment.

Examples and Proposals

Computing Equipment

The example of the BTN offers several advantages for the classification of computing equipment. It has virtually universal acceptance; it covers both systems of equipment and separately imported units; it provides for new units of equipment by virtue of its avoidance of identifying specific units; and it permits variations in tariff treatment within a particular heading with respect to groups of products and allows for conditional clauses.

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(1) EIAC brief, p. 3.

The direct adoption of the pertinent BTN heading does not appear feasible, however, without the accompanying explanatory notes. It is not clear from the heading, for example, that related telecommunications equipment is encompassed. Two other reasons for believing that the BTN might not be appropriate for classifying computing equipment were cited by a manufacturer in a letter to the Board. First, it was felt that because the Brussels Nomenclature recognized a system of equipment, naming specific units of equipment had been avoided. In contrast, because the systems concept had not been recognized in the Canadian tariff, it was felt that the particular units constituting a computer system would need to be identified in a new tariff item, at least by broad types of equipment, otherwise eo nomine tariff items would take precedence. Examples cited were input/output typewriters, magnetic tape units, teleprocessing equipment and sensor-based input/output units. Second, it was stated that the BTN contained no provision for articles and materials used in the manufacture of computing equipment. This second aspect is dealt with below under parts.

Another example of a very broad terminology is contained in the TSUS. It covers computing equipment under item 676.15 "Accounting, computing, and other data-processing machines." As noted in Chapter III,[1] there is, however, the possibility that this item does not encompass all computing equipment, and that item 676.52 "Parts of the foregoing: other" may also be used to classify certain units of computing equipment. The very general nature of the TSUS terminology undoubtedly permits the importation of both complete systems and separate units of equipment. It provides much scope for the importation of new types of computing equipment. The disadvantages of using a TSUS type of nomenclature lie mostly in its extreme generality: there is no reference to related telecommunications equipment, and the use of the term "accounting machines" encompasses non-relevant products.

The industry nomenclature proposals may be largely characterized as being of a general nature, but with some significant variations among them. The CBEMA and IBM proposals are very closely aligned.[2] Both contain terminology which identifies at least some of the types of equipment used in data processing. The reason appears to be due to the belief that tariff items of greater specificity might take precedence unless the equipment is named. For example, tariff item 44538-1 specifies "Recorders, reproducers and dictation recording and transcribing equipment using magnetizable tape as a recording medium ..." hence, CBEMA and IBM include "magnetic tape units" in their proposed nomenclatures. On the other hand, a tariff item specifying magnetic disk units or equipment using magnetizable disks as recording media does not exist; consequently, no need is seen for actually naming magnetic disk units as they presumably would be accommodated within the general terminology of the proposals as "Data processing machines and apparatus" or "support equipment designed for use therewith." In commenting on its proposal, CBEMA stated that:

(1) Page 115.
(2) These and other proposals are specified in detail in Appendix A.

> The wording of the recommended classifications is designed to indicate CBEMA's intent rather than a specific nomenclature. ... It is recommended that the ultimate wording make provision for rapid technological change and for compatibility with the nomenclature used by other principal trading partners.(1)

IBM also qualified its proposal in the following manner:

> The wording of the proposed tariff items is intended to be wide enough to encompass all existing data processing products. It should be recognized that the wording may not be adequate to cover all future products. Therefore, it may be necessary to amend the wording from time to time.(2)

The CBEMA and IBM proposals appear to cover both systems of equipment and separately imported units. They appear to provide sufficient scope for the accommodation of new devices, but the IBM proviso suggests that it may be impossible to foresee and provide for all future products in this rapidly-changing industry. The proposals also appear amenable to variations in tariff treatment with respect to particular groups of products and conditional clauses.

The CPA proposals with respect to computing equipment are of two types: the first refers to computers and ancillary computer equipment of a class or kind available in Canada from Canadian manufacturers; the second identifies computing equipment, partly by types of unit and partly by functional descriptions. The CPA stated that its tariff wording is not intended to be in its final form, and it is apparent that the intent could be accomplished within a single tariff item with conditional clauses of class or kind.

The terminology used by EIAC is perhaps the most general of all industry proposals, being intentionally broad so as to be all-inclusive of computer apparatus. The Association recognized that classification difficulties could arise in relation to existing, more specific tariff items, such as those concerning typewriters, printing presses, cash registers, and calculating machines. These difficulties could be overcome, in EIAC's view, by preparing Interpretation Rules similar to those preceding Group XII of Schedule "A" to the Customs Tariff, and by specifying therein all goods deemed to be provided for in the computer apparatus schedule. The broad terminology of the EIAC proposal appears to allow for both systems of equipment and separately imported units, and it does not seem to preclude new computer products. The generality of the proposal, however, is contingent upon the recognized need for an equipment listing as an integral part of the tariff item. It is, therefore, much more of a specific nomenclature than might seem evident from the proposed terminology.

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(1) CBEMA brief, p. 51-52.
(2) IBM brief, p. 10.

The foregoing discussion of existing and proposed nomenclatures for computing equipment indicates that several terminologies might be suitable, and that any one of them would undoubtedly be an improvement over the current situation. The actual terms used have been juxtaposed in Table 10.1 in order to compare and contrast the specific wording involved.

None of the proposals, nor existing nomenclatures use explicitly the term "system," although the explanatory notes of the BTN describe the form of a system, and what a complete digital data processing system must comprise.(1) They also avoid the use of the term "equipment."

The BTN uses the term "and units thereof" in conjunction with automatic data processing machines. This seems illogical and unnecessary because a machine connotes an entity. However, if the term "machine" is used as a synonym for "system of equipment," then the words "and units thereof" may be a method of ensuring that separately-housed constituent units of equipment can be accommodated whether imported separately or as a system.

The explanatory notes of the BTN identify units of equipment only by general types of functions, such as input unit; none appear within the main BTN heading, although it could be argued that Magnetic and Optical Readers describe both the method and function of particular data processing machines. The CPA terminology is largely also functionally-oriented. In contrast, the CBEMA and IBM terminology is a mixture of functional descriptions and specifically-named units. The intent is to make the tariff item more specific than other existing tariff items, and to ensure its precedence. However, if this is a valid argument, then other units such as printers would need to be specified in view of the existence of tariff item 41202-1 - Printing presses, n.o.p. ... which has been used to classify such devices. An alternative method to ensure precedence of a new tariff item for data processing equipment would be to employ the phrase "whether or not otherwise enumerated."

The reference to "Control and adaptor units ... to effect interconnection of the c.p.u. to ... remote terminals ..." in the BTN explanatory notes indicates that the function of data communications is recognized, but it is not clear that these units encompass all related telecommunications equipment in use at this time. The CBEMA and IBM proposals use the term "teleprocessing" which connotes the function of data communications more clearly than "telecommunications," and which tends to differentiate it from other types of communications.

In Chapter II, the Board identified support equipment as stand-alone peripherals encompassed under data entry, data preparation, and data handling systems and devices. This is most nearly equivalent to the BTN terminology, and also represents the intent of CBEMA and IBM, as revealed in their briefs.

(1) Chapter III, pp. 112 and 112.

Table 10.1: Terminology Relating to Finished Computer Products in Existing and Proposed Nomenclature

Type of Computing Equipment	Sources of Terminology					
	BTN	TSUS	CBEMA	IBM	CPA	EIAC
Computer systems	Automatic data processing machines	Computing and other data processing machines	Computers and related data processing machines and apparatus	Data processing machines and apparatus	Computers	Data processing apparatus
Units of equipment	and units thereof	(included or under parts)	(included)	(included)	and ancillary computer equipment	(included)
Functionally-named or specifically-named units of equipment	(explanatory notes: c.p.u., input unit, output unit, analogue elements, control elements, programming elements, processor enhancements, power supply units)		including magnetic tape units, sensor based input/output units, input/output typewriters, reusable storage media	including magnetic tape units, sensor based input/output units, input/output typewriters	including c.p.u's storage and memory systems, online input/output devices, off-line equipment for use with c.p.u's associated control equipment	(a)
Related telecommunications equipment	(explanatory notes: control and adaptor units, signal converting units)	(included or under parts)	related tele-processing machines and apparatus	related tele-processing machines and apparatus		related telecommunications equipment(a)

Table 10.1: Terminology Relating to Finished Computer Products in Existing and Proposed Nomenclature (concl.)

Type of Computing Equipment	BTN	TSUS	CBEMA	IBM	CPA	EIAC
Support equipment	magnetic or optical readers, machines for transcribing data onto data media in coded form, and machines for processing such data, not elsewhere specified or included	(included or under parts)	support equipment designed and intended for use therewith	support equipment designed for use therewith	all other computer equipment, n.o.p.	(a)
Miscellaneous products	(some are included under parts heading 84.55)		interconnecting cables, controls, accessories and attchments	interconnecting cables, controls, accessories and attachments	all other computer equipment, n.o.p.	accessories and attachments for use therewith

(a) To be specified under Interpretation Rules.

Source: Industry briefs, the BTN and the TSUS.

The CBEMA, IBM, and EIAC proposals also illustrate the requirement for the nomenclature to cover several articles which, although small and ill-defined relative to other units of equipment, may well be essential to the operation of a computer system. Interconnecting cables appear to be covered within the explanatory notes of BTN heading 84.53, as are controls (control and adaptor units). Accessories in the BTN are covered in conjunction with parts under heading 84.55, and are defined as:

> ... interchangeable parts or devices designed to be mounted on a machine to adapt it for a particular operation, or to perform a particular service relative to the main function of the machine, or to increase its range of operations.

These accessories include form feed devices, auxiliary printing devices, totalling devices, and stands not normally usable except with the machines in question. They exclude covers, carrying cases and furniture. Therefore, the term "accessories and attachments" proposed by CBEMA, IBM and EIAC appears to be in line with the BTN coverage.

Summarizing the foregoing discussion, a general terminology relating to computing equipment might be along the following lines:

> Data processing machines and apparatus and units thereof, whether or not otherwise enumerated; support equipment designed for use therewith, including computer-related teleprocessing machines and apparatus, teletypewriters, data entry, data preparation, and data handling machines; accessories and attachments for use therewith.

Parts, Components and Subassemblies

A nomenclature required to encompass parts of computing equipment will depend largely on whether there is need to differentiate manufacturing and replacement parts. Where imports of computing equipment parts are concerned, the bulk is destined for assembly into finished products, with replacement parts accounting for perhaps no more than 5 per cent of the total.

An analysis of parts imports during the survey period indicates that five tariff items accounted for some 98 per cent of the total value. These were: 42700-1, with 82 per cent; 41415-1 with 10 per cent; 44524-1, with 4 per cent; and 69605-1 and 44538-1, each with slightly over 1 per cent. These tariff items have all been used to accommodate finished computer products, indicating that virtually all computing equipment parts are classified with their associated finished products, and not under their potential eo nomine tariff items.

It appears, therefore, that an unrestricted parts tariff item which relates to a computing equipment tariff item would be in keeping with current classification practices. Table 10.2 shows the terminologies used in existing and proposed nomenclatures for computing equipment parts.

Table 10.2: Terminology Relating to Computing Equipment Parts in Existing and Proposed Nomenclatures

Type of Parts	Source of Terminology		Terminology
Replacement	CBEMA & IBM	(A)	Parts of all the foregoing.
	CPA	(B)	Parts of the foregoing.
Manufacturing	CBEMA & IBM	(C)	Articles and materials that enter into the [cost of] manufacture of the goods enumerated in tariff item 1, proposed above.
	CPA	(D)	Complete parts of computers and ancillary computer equipment, when imported by manufacturers of computer equipment for use in the manufacture of such equipment in their own factories.
Replacement & manufacturing	BTN	(E)	Parts and accessories (other than covers, carrying cases and the like) suitable for use solely or principally with machines of a kind falling within heading ... 84.53 ...
	TSUS	(F)	Parts of the foregoing: other.
	EIAC	(G)	Parts [assemblies and sub-assemblies] of the foregoing, n.o.p.
Other	SPIC	(H)	Parts of plastic for computers and related telecommunications equipment.

[...] Optional terminology.

Source: Industry briefs, the BTN and the TSUS.

The BTN parts heading is designed to complement the BTN computing equipment and related headings; as such, its use is predicated on the use of the BTN equipment heading. Although the BTN does not distinguish between manufacturing and replacement parts, sub-headings to reflect this differentiation could be introduced, but would result in a surfeit of terminology relating to parts.

The TSUS treatment of parts is as general as its treatment of finished products. It is possible that some computing equipment parts are classified under eo nomine parts tariff items in the TSUS. It might be assumed that, in view of the predominance of the U.S. parts industry, most of the parts imported into the United States are replacement parts for non-U.S. equipment. The TSUS nomenclature, therefore, may be much more suitable in that context than it would be for other countries.

The industry nomenclature proposals vis-à-vis parts are naturally more attuned to Canadian circumstances than either the BTN or the TSUS. The proposals submitted by CBEMA and IBM concerning parts for computing equipment (Tables 10.2(A) and (C)) are identical. In proposing the first tariff item, CBEMA considered that it should encompass all parts not intended to be used in the production of finished goods:

> It is proposed that maintenance parts, original equipment modifications and similar items be included in the first item since they are identified with the finished installed equipment rather than with manufacturing. Typically, such parts are installed on the computer user's premises, rather than in the factory as part of the manufacturing process. In addition, many 'field modification' items result in enhancements or upgrading of the originally installed system.(1)

The second tariff item (Table 10.2(C)) covering articles and materials (including parts) that enter into the cost of manufacture, could cover all of the manufacturing inputs associated with the production of computing equipment. There are, however, a few similar items in the Canadian tariff, such as 44200-1, which are applicable to articles and materials that enter into the cost of manufacturing machinery. Such tariff items might, it could be argued, take precedence over other parts tariff items, even those specifically named. At the public sittings, the representatives of both CBEMA and IBM agreed that they would be equally satisfied with a nomenclature which excluded the words "... cost of ..." from the second proposed tariff item.

The first tariff item of the CPA proposal relates to replacement parts (Table 10.2(B)); the second item in the CPA proposal refers to manufacturing parts (Table 10.2(D)). The nomenclature of CPA's proposed second tariff item is similar to that of a number of existing items in the Canadian tariff, such as tariff item 41435-1 which covers parts of cash registers. Such a tariff item would, it might be contended, take precedence over other items in the Customs Tariff, except for eo nomine items not having n.o.p. clauses.

The nomenclature of the EIAC proposal (Table 10.2(G)) dealing with parts, except for the n.o.p. notation, is the same nomenclature as the TSUS, and the same as the proposed nomenclatures of CBEMA, IBM, and CPA with respect to replacement parts. EIAC's proposal does not make a distinction between replacement and manufacturing parts. At the public sittings, an EIAC spokesman stated that,

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(1) CBEMA brief, p. 51.

for greater clarity, their proposed nomenclature could read "parts, assemblies and subassemblies of the foregoing, n.o.p."(1) Such wording would of course accord precedence to existing eo nomine items for such parts.

The Society of the Plastics Industry of Canada proposed (Table 10.2(H)) that, in addition to the adoption of the BTN, there should be a specific tariff item for plastic components intended to take precedence over a general parts item where parts of plastic would receive the same tariff treatment as parts of any other material. The issue raised by the SPIC proposal is whether parts mostly or wholly made of a certain material for a specific use should be identified and provided for in the tariff.

The major issue, whether there is a need to differentiate manufacturing and replacement parts, cannot be fully answered on the basis of nomenclature arguments alone; it also involves economic considerations. But as the Canadian market is largely supplied by imported equipment, it is a safe assumption that replacement parts are virtually all imported, probably to an even greater extent than the proportion of imported equipment supplied to the domestic market. The only real possibility for Canadian parts suppliers would appear to be the production of parts used in the manufacture of finished products in Canada, and not replacement parts for imported equipment. For this reason a phrase such as "parts of the foregoing" could therefore be added to a computing equipment tariff item.

The choice of terminology in so far as manufacturing parts are concerned depends largely on the extent to which it is desirable to channel production inputs into one tariff item at a set rate of duty. The final considerations in this context, therefore, are economic; these are dealt with later in the chapter.

A provision for replacement parts in the item for finished data processing equipment, along with a separate item for manufacturing parts, would mean that this latter item and its provisions would apply to, not only, parts for the finished equipment in the main item but also parts used in the manufacture of replacement parts. The nomenclature of the item for manufacturing parts in these circumstances takes on added significance, because, as an end-use item, it would take precedence over most existing eo nomine items for such parts. The use of the words "articles and materials" for use in the manufacture of the goods enumerated in the main tariff item would mean that this wording would cover raw materials such as resins, sheet metal, copper wire required to make the basic parts of computing equipment as well as the parts and materials for manufacturing the finished units of computing equipment. A more restrictive wording would be "complete parts" inasmuch as this would not cover materials used either in the manufacture of the finished data processing equipment or the parts therefor. Such materials would continue to be provided for under existing tariff items, at existing rates; this solution might be acceptable because Canadian computing equipment manufacturers purchase materials domestically more so than parts.

(1) Transcript, Volume II, p. 177.

An alternative to providing separate treatment of parts for replacement purposes and parts for use in manufacturing is to combine them into a single tariff item. In other words the reference to "parts of the foregoing" could be omitted from the main new tariff item, and the parts item could read "parts of the goods enumerated in the preceding tariff item." As such it would include both replacement and manufacturing parts. The coverage of the item could be extended by referring to "articles and materials" rather than "parts."

An item worded as above, i.e., without any conditional clauses, would, in the Board's view, take precedence over eo nomine parts items with a n.o.p. provision, but not over end-use parts items or eo nomine items without a n.o.p. provision. Also parts items with respect to computing equipment with a n.o.p. provision, as suggested by the EIAC, would not take precedence over eo nomine parts items with a n.o.p. provision.

Currently-Used Tariff Items

This section examines the implications of introducing a new tariff item for computing equipment and parts on tariff items that are currently used to classify these goods. Most of the implications will depend ultimately on the final nomenclature that is adopted for the new tariff item, or items, as well as the recommended rates of duty.

The tariff items that have been mostly used[(1)] to classify computing equipment and parts such as 41202-1, 41415-1, 42700-1, 44506-1, 44524-1, and 44538-1, would no longer serve this purpose. As more than three-quarters of all computing equipment and parts imported during the survey period entered under tariff items 41415-1 and 42700-1, these items would be most affected in terms of volume of imports. The machinery program associated with tariff item 42700-1 would no longer be concerned with the importation of computing equipment and parts, although, in the event that the new tariff item(s) were to provide protection for such equipment of a class or kind made in Canada only, similar criteria of determination regarding availability from Canadian production would still be required.

End-Use Tariff Items

The Tariff Board survey indicates that 16 or more end-use tariff items have been used to classify computing equipment and parts. Inasmuch as most of these end-use items are general in nature a specific item for computing equipment and parts, without an n.o.p. provision, would take precedence, even without the words "whether or not otherwise enumerated." However, it would appear that such a nomenclature would exclude equipment, and parts thereof, entering under tariff item 69605-1. The new tariff item would override even item 69605-1 with the inclusion of "whether or not otherwise enumerated." It will be recalled that there are also a number of

(1) See Chapter III, p. 91.

other tariff items, such as 41400-1 "Typewriters" and 44539-1 "Tape Transport Mechanisms," which also probably would take precedence over the new tariff item for data processing equipment unless the words "whether or not otherwise enumerated" are included.

Since all of these end-use items, except tariff item 41210-1, provide duty-free entry under the M.F.N. and B.P. tariffs, it follows that the continued inclusion of imports of computing equipment and parts under them would be of little concern if the rate recommended for the new tariff items is also free. Under the same circumstance the exclusion of data processing equipment and parts from these end-use items would also not affect the tariff treatment of these goods. On the other hand in the event that a rate of duty is recommended for computing equipment and parts then the inclusion of such equipment in the present end-use items would reduce the average level of protection for Canadian manufacturers, while their exclusion would deny present end-users their preferential tariff treatment.

These considerations would also apply with respect to tariff item 69605-1, with the additional complication that if the new tariff item, appropriately worded, were to take precedence, importers of computing equipment, currently entering under that end-use item, would lose their sales tax-exempt status. It could be considered that the sales tax exemption provision of tariff item 69605-1 as it concerns computing equipment, is outside the scope of the Reference; a position which the Board took in Reference 134 - Equipment for Hospitals and Other Institutions.

The retention of tariff item 69605-1 for the classification of computing equipment for the uses specified, and its exclusion from the new tariff items for this equipment, could be realized by keeping the words "whether or not otherwise enumerated" and specifically excluding computing equipment for the uses specified in 69605-1. Also, the clause "whether or not otherwise enumerated" can be dropped from the new tariff item and its coverage can be extended by a more specific listing of the types of equipment whose inclusion would be rendered doubtful by the omission of that clause.

Integrity of Currently-Used Tariff Items

Concern was expressed in submissions to the Board and at the public sittings that the integrity of certain currently-used tariff items be maintained. The Board does not, in fact, see a necessity for any changes as to descriptions and rates of duty in these items. At the same time, the consolidation of most computing equipment and parts in a new tariff item would inevitably mean that currently-used tariff items, with the exceptions previously noted, would no longer be used for the classification of these goods. To this extent, and to the extent that the new item would take precedence in particular situations, the integrity of currently-used tariff items could not be maintained. There were also submissions requesting changes in a number of tariff items relevant to this Reference.

The CPTA, Minnesota Mining and Manufacturing of Canada Limited, and Bell & Howell Canada Ltd., drew to the Board's attention the fact that certain photographic equipment encompassed by Tariff Board Reference 147 might also require consideration under this Reference. At issue are certain products imported under tariff items 46200-1 and 46241-1, both of which have been referred by the Minister. Under the first item, the Board's survey indicated that optical reader units had been classified therein (as well as in tariff item 42700-1). Such peripheral input units, whether of the OCR, MICR or mark-sense types, are clearly designed as integral devices within a computer system.

Computer output microfilmers (COMs) are the second type of product requiring consideration. Although none of this type of equipment was imported during the period covered by the Tariff Board survey, it is a very specialized type of apparatus, some models of which can receive and process data directly from a computer system to which it is connected, while others operate only in an off-line mode where computer output previously recorded on magnetic tape becomes input to the microfilmer. In an on-line mode, it is apparent that COM equipment is an output sub-system of a computer system and as such requires consideration for inclusion under the new computing equipment tariff item. COM devices consisting of a magnetic tape drive, a controller, and an electron beam recorder, but not connectable directly to a computer system have less claim for consideration. In view of the latter type's use of magnetic tape input, however, the Board is of the opinion that it represents most nearly a stand-alone peripheral device. Both types of COM equipment should, therefore, be included under the computing equipment tariff item. This would obviate the need for tariff items 8453-1 and 8453-2 tentatively proposed in Reference 147. Similar apparatus which photographs and records computer print-outs on microfilm is quite apart from that under discussion, and is not considered relevant. Changes to existing tariff items 46200-1 and 46241-1 are not considered necessary as a result of any findings of this Reference.

Northern Telecom Ltd., was concerned with the integrity of three items: 44506-1 - Electric telegraph apparatus and complete parts thereof; 44508-1 - Electric telephone apparatus and complete parts thereof; and 44533-1 - Radio and television apparatus and parts thereof, n.o.p. The Board considers that these tariff items should remain unchanged as to descriptions and rates of duty, but certain equipment currently classified thereunder would be encompassed by the new computing equipment tariff item, including data communications terminals, data entry units, modems, data sets and any products that have been identified as being computer-related telecommunications equipment.

CN-CP Telecommunications was concerned with the costs of duty on heavy-duty teletypewriters, teleprinter equipment and component parts of a class or kind not manufactured in Canada, and requested amendments to tariff item 44506-1 so as to allow duty-free entry for these products. They were supported in their brief by Northern Telecom Ltd., which had previously manufactured certain models of teletypewriter, and by Marsland Engineering Ltd., which currently produces two models of standard-duty equipment. These teletypewriters have alternative uses; both heavy-duty and standard-duty machines may

be used as message terminals unconcerned with data processing functions or as data communications terminals. Although the case for reducing or eliminating tariffs on heavy-duty teletypewriters appears persuasive, as they are not made in Canada, message terminals per se are outside the Board's mandate; hence, the Board cannot pass judgment on the issue. However, for those models of teletypewriters designed for use as computer-related data communications terminals, the Board considers that they would be most properly encompassed by a new computing equipment tariff item; other models designed for the transmission of messages would continue to be classified under tariff item 44506-1. Tariff items 44508-1 and 44533-1 would also remain unchanged as to descriptions and rates of duty.

Northern Telecom Ltd., was also concerned that certain existing eo nomine tariff items remain unchanged; specifically tariff item 44542-1 - Electron tubes ..., and tariff item 44544-1 - Transistors ... . These tariff items would not receive precedence where electron tubes and transistors for use in computing equipment are concerned, however, if the final nomenclature adopted for parts used in the manufacture of computing equipment were of the type recommended by CBEMA. EIAC was similarly concerned with preserving the existing priority of parts currently enumerated eo nomine in the Customs Tariff, and recommended that the n.o.p. notation be adopted with respect to a computer parts tariff item.

Data Processing Media

Where data processing media is concerned, Canadian tariff treatment, for the most part, coincides with the tariff treatment accorded media in the BTN and TSUS. Tariff items 65810-1 and 65811-1 accommodate magnetic recording tape in unrecorded and recorded form respectively. Other tariff items accommodate media made of paper. There are two forms of media, however, that are not specifically covered: magnetic disks and magnetic drums. In some instances, these are fixed within a magnetic disk or drum unit and are not normally removable; they are therefore an integral part of the unit and would be accommodated within the nomenclature for data processing machines and units thereof. In other instances, the disks are in the form of removable disk packs and are supplied separately. It is believed that all disk packs are currently classified in tariff item 42700-1. A new computing equipment tariff item would leave disk packs as the sole remaining type of computing equipment classified in tariff item 42700-1.

In order to obviate this anomaly, three possibilities exist: first, by following the equivalent practice with respect to magnetic tape recordings, i.e., by accommodating magnetic disk packs under tariff item 59730-1 - phonograph records (certain changes to this nomenclature would probably be required); second, by including within the nomenclature for the new computing equipment tariff item terminology words such as "reusable storage media", as that suggested by CBEMA; or third, by providing for them in a new computing equipment tariff item by the use of the words "accessories and attachments for use therewith."

RATES OF DUTY

The various rates of duty currently applicable to computing equipment and parts were presented in Chapter III. The main concern of the Board is with rates of duty under M.F.N. tariffs, as over 95 per cent of the value of imports surveyed had originated in M.F.N. countries. The average rates of duty paid by product group during the survey period are summarized in Table 10.3 Much of this section is focussed upon these averages in view of the many tariff items and rates of duty applicable to computing equipment and parts. The range of nominal rates of duty is also important, particularly when rates are much higher or lower than the averages.

Table 10.3: Average Rates of Duty Paid on Imports of Computing Equipment and Parts by Product Group Before and After Remission of Duties, Two Months, 1971

	Average Rates of Duty Paid		
	B.P.	M.F.N.	All Tariffs
	- per cent -		
Total Value of Imports by Tariff	4.5	95.5	100.0
Before Duty Remissions:			
Mainframes	Free	8.9	8.6
Peripherals	2.5	12.2	11.5
Related telecommunications equipment	-	15.1	15.1
Total Computing Equipment	2.1	11.2	10.7
Parts	2.8	14.2	13.9
Total Computing Equipment and Parts	2.3	12.3	11.9
After Duty Remissions:			
Mainframes	Free	8.6	8.4
Peripherals	1.2	7.0	6.6
Related telecommunications equipment	-	15.1	15.1
Total Computing Equipment	1.0	7.7	7.3
Parts	1.5	11.8	11.5
Total Computing Equipment and Parts	1.1	9.2	8.8

Source: Tariff Board survey.

Although data are limited with respect to all of the effects of existing tariff protection, it is possible to estimate some of the major cash "costs" and "benefits" of the duties on computing equipment as they relate to users, producers and governments. The cost of existing import duties to Canadian users is not limited to the amount of duty collected; federal sales tax is also levied on the duty-paid value of imported computing equipment. Moreover, provincial sales taxes, where applicable, are levied on the retail price to the user which incorporates duty as well as federal sales tax. Increased sales taxes therefore result from the imposition of duty, and the cost of

the duty to users is greater than the actual amount of duty collected. Furthermore, it is reasonable to assume that Canadian producers take full advantage of the available protection and "price up" their finished equipment to the level of prices of similar imported products. Thus, the cash costs to users resulting from the presence of duties arise not only from the higher prices of imported products, but also from the higher prices at which domestic products can be sold.

The cash benefits to Canadian producers are represented by the additional income they earn as a result of the higher prices for domestic products, brought about by the existence of duties on similar imported equipment. Benefits to governments arise because duties and sales taxes become part of governmental revenues. Duties and federal sales taxes accrue to the federal government, and provincial sales taxes accrue to provincial governments where applicable. Sales taxes are increased as a result of duties on computing equipment.

Table 10.4 indicates the estimated cash costs and benefits of the duties on computing equipment in 1972. A basic assumption of the estimates is that domestic production, imports and exports would remain unchanged if duties were removed. While this is unlikely to be the case, a radical departure from the situation presented is equally unlikely because of the structure and composition of the industry. The estimates of cash costs and benefits are therefore considered to be both valid and useful.

The estimated total additional costs to Canadian users were $21.4 million in 1972, or about 131 per cent of the duties paid at $16.3 million. The largest share of the benefits of the tariff, 84.1 per cent, accrued to the federal government, and consisted of 76.2 per cent from customs duties and 7.9 per cent from federal sales taxes. This large share arises primarily because of the very small proportion of the Canadian market supplied from domestic production; the share of benefits derived by domestic producers was estimated to be only 9.8 per cent. Under existing tariffs, an increase in imports relative to domestic production would reduce the benefits derived by Canadian producers and increase those of governments.

It is also useful within the discussion of current rates of duty to examine the effective protection(1) that computing equipment has received. Ideally, measures of effective protection are based on detailed unit costs of final products, and equally detailed data on their direct inputs. When the tariffs assessed on both are known, their effects on the value added for the products in question can be calculated. The calculation of the effective protection on a sufficient number of representative products would lead to a greater understanding of how the structure of nominal tariffs affects the pattern of production in the computing equipment industry.

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(1) The producer's real or effective protection is measured by the difference between the amount of benefit he derives from the nominal protection on his output, and the amount of cost he must pay due to the protection incorporated by his suppliers in the price of his material inputs. The amount of this difference measured against his net output or value added indicates the rate of effective protection.

Table 10.4: Estimated Distribution of Cash Costs and Benefits of the Duties on Computing Equipment, in Canada, 1972

	With Existing Rates of Duty	Excluding Duty	Cash Costs or Benefits Resulting from Duty	Distribution of Total Costs and Benefits
	- $ million -			%
Imports[(a)]	223.3	223.3	-	-
Domestic production minus exports[(b)]	15.9	13.8	2.1	9.8
Market	239.2	237.1	2.1	9.8
Duty collected[(c)]	16.3	-	16.3	76.2
Federal sales tax	24.5	22.8	1.7	7.9
Software, services & gross margins	318.0	318.0	-	-
Price to users[(d)]	598.0	577.9	20.1	93.9
Provincial sales tax	38.9	37.6	1.3	6.1
Cost to users	636.9	615.5	21.4	100.0

(a) F.o.b. point of shipment, excluding duty.
(b) F.o.b. plant. It is assumed that Canadian producers take advantage of the existing tariff in pricing their equipment.
(c) Average of 7.3 per cent after remission.
(d) As indicated in earlier chapters, prices to the user of computing equipment sold in Canada are based on U.S. prices. An amount is added to cover duty, federal sales tax and other costs incurred in Canada. Prices are not based on a percentage mark-up on the duty paid value of imports.

Source: Tariff Board.

In the absence of such data for this industry, effective protection can only be calculated by relying on aggregate data by product group, and by using a number of critical assumptions. These assumptions are that the equipment produced in Canada is priced up to the tariff; that duty-free imports of computer products are of a type not produced in Canada; that the direct inputs are common to all product groups; and that the value added in the computing equipment industry was equivalent to the value added in the office and store machinery industry in 1972. In this latter industry, value added was 33.5 per cent in 1971, 36.0 per cent in 1972, and 41.3 per cent in

1973. The changes in value added from year-to-year would also result in changes to effective tariff rates, but as other changes in weighted average rates of duty could also occur, this analysis is limited to the data for 1972.

The estimated rates of effective protection under M.F.N. tariffs are presented in Table 10.5. The situation in which production is retained for the domestic market only is shown, i.e., after duty remissions but before duty drawbacks which would not be applicable. The situation which relates to exported production is not relevant to effective protection. Adjustments have been made to the value added for each product group in accordance with their ratios of direct inputs to total factory costs of production. The weighted average rates of duty paid have been derived by excluding the amounts of duty-free imports of both products and parts, so that only dutiable imports remain for finished equipment and direct inputs.

Table 10.5: Estimated Rates of Effective Protection by Product Group, After Duty Remissions, and Under M.F.N. Tariffs, 1972

	Weighted Average Rates of Duty Paid		Assumed Value Added	Estimated Rates of Effective Protection
	Finished Equipment	Direct Inputs	Finished Equipment	
	%	%	%	%
Product Group				
All computer products	11.6	14.4	36	6.6
Mainframes	10.1	14.4	50	5.8
Peripherals	12.3	14.4	35	8.7
Related telecommunications equipment	16.7	14.4	37	20.6

Source: Tariff Board

The weighted average rate of duty of 14.4 p.c. on direct inputs may be marginally higher than is actually the case because of duty drawbacks on sales to eligible customers under tariff item 69605-1. To the extent that duty drawbacks relating to duties paid on parts incorporated in domestically-retained production are claimed and paid,(1) the rates of effective protection on domestically-retained production would be slightly higher than indicated. Nevertheless, it is apparent that the effective rates of duty on computing equipment sold in the domestic market are, with the exception of related telecommunications equipment, quite low. The estimated effective rate of duty

(1) At the public sittings, Datagen of Canada Ltd. stated that it had had great difficulty in administering duty drawback claims of this nature. (Transcript, Volume III, p. 240).

on related telecommunications equipment, at 20.6 p.c., is higher than both the weighted average rate of duty and the highest nominal rate of duty on these products, but this equipment accounted for less than two per cent of the total value of Canadian production of computing equipment.

Tariff Rate Proposals

A summary of the proposals made to the Board concerning rates of duty is shown in Table 10.6. The proposals are classified in three categories: computing equipment; parts (replacement or replacement and manufacturing); and articles and materials that enter into the manufacture of computing equipment. The highest M.F.N. rates proposed on computing equipment are those by GTE Automatic Electric (Canada) Ltd., and by EIAC on a class or kind made in Canada, at 15 p.c. On used computing equipment, Greyhound Computer of Canada Ltd., proposed a rate of 25 p.c. B.P. and M.F.N. The highest M.F.N. rates proposed on parts are those by SPIC for parts of plastic at 17.5 p.c., and by EIAC on parts of a class or kind made in Canada at 15 p.c. The M.F.N. tariff proposals for articles and materials are all at a free rate of duty.

Table 10.6: Specific Proposals for Tariff Rates Made to the Board on Computing Equipment, Parts, and Articles and Materials

	Rate of Duty		
	B.P.	M.F.N.	General
		- per cent -	
Computing Equipment			
Burroughs Business Machines Ltd.	Free	Free	25
CBEMA	Free	Free	25
International Computers of Canada Ltd.	Free	Free	25
Olivetti Canada Limited	Free	Free	25
Sperry-Rand Canada Ltd., UNIVAC Division	Free	Free	25
NCR[(a)]	-	7.5-10	-
IBM Canada Ltd.[(a)]	Free	10	25
Digital Equipment of Canada Ltd.	-	10	-
GTE Automatic Electric (Canada) Ltd.	-	15	-
Datagen of Canada Ltd.	Retain present rates of duty on computers		
J.M. Ardron[(b)]		Dutiable	
Canadian Petroleum Assn.[(c)]			
made in Canada	-	10	15
not made in Canada	Free	Free	Free
EIAC			
made in Canada	15	15	25
not made in Canada	Free	Free	25
Comterm Limited			
made in Canada	Duty should be charged		
not made in Canada	Free	Free	-
Greyhound Computer of Canada Ltd.[(d)]	25	25	25

Table 10.6: Specific Proposals for Tariff Rates Made to the Board on Computing Equipment, Parts, and Articles and Materials (Concl.)

	Rate of Duty		
	B.P.	M.F.N.	General
		- per cent -	
Parts			
Burroughs Business Machines Ltd.	Free	Free	25
CBEMA	Free	Free	25
GTE Automatic Electric (Canada) Ltd.	-	Free	-
International Computers of Canada Ltd.	Free	Free	25
Olivetti Canada Limited	Free	Free	25
Sperry-Rand Canada Ltd., UNIVAC Division	Free	Free	25
NCR[(a)]	-	7.5-10	-
Digital Equipment of Canada Ltd.	-	10	-
IBM Canada Ltd.[(a)]	Free	10	25
Canadian Petroleum Assn.			
made in Canada	-	10	15
not made in Canada	Free	Free	Free
EIAC			
made in Canada	15	15	25
not made in Canada	Free	Free	25
Society of the Plastics Industry of Canada (Parts of plastic)			
made in Canada	15	17.5	30
not made in Canada	Free	Free	Free
Comterm Limited			
made in Canada	Duty should be charged		
not made in Canada	Free	Free	Free
Articles and Materials			
Burroughs Business Machines Ltd.	Free	Free	25
CBEMA	Free	Free	25
IBM Canada Ltd.	Free	Free	25
International Computers of Canada Ltd.	Free	Free	25
Olivetti Canada Limited	Free	Free	25
Sperry-Rand Canada Ltd., UNIVAC Division	Free	Free	25
NCR	Free	Free	25

(a) Provides for earned remission of duties.
(b) Graduated duties and rebates from first delivery of the equipment.
(c) Computing equipment should be permitted duty-free entry except for specifically named items which are available from Canadian sources.
(d) Used computing equipment.

Source: Industry briefs.

At present although a large proportion of computing equipment imported into Canada is dutiable, a large proportion also enters duty free. The Board therefore examined the implications of some average level of protection for computing equipment as well as free entry. It also explored the applicability of an earned duty remission program and of providing qualified protection, i.e., to equipment of a class or kind made in Canada only.

In keeping with proposals relating to nomenclature, a single tariff item for computing equipment would provide for the entry of most, if not all, computing equipment, at the same rate of duty, whereas with the current multiplicity of relevant tariff items several rates are applicable. An average M.F.N. rate of $12\frac{1}{2}$ p.c. could be considered; this would be close to the weighted average rate of duty on dutiable imports of computing equipment of 11.6 p.c. M.F.N., in Table 10.5. Such an average single rate of duty would confer the following advantages:

- it would continue to provide a level of protection for domestic producers catering to the Canadian market;
- it would obviate the inconsistency of different rates of duty for units of equipment within a system;
- it would obviate the need to be concerned with what is/is not made in Canada or what is/is not available from Canadian production as encountered in the present classification system.

The disadvantages of this average level of protection include the following:

- it would not be of benefit to domestic producers, except for the very few supplying only the domestic market with a very limited range of equipment, and which amounts to only a minor portion of the total market value;
- it would leave a tariff on all equipment, much of which may never be made in Canada, and which could be regarded as an unfair and pointless burden on users generally, and on the computer services industry in particular;
- it would not take account of the differences in current rates of duty among products or among product groups; providing some types of equipment with more protection and others with less.

At any higher average rate of duty than $12\frac{1}{2}$ p.c., the same advantages and disadvantages would still apply, but the burden on users would become more onerous without significant compensatory benefits to domestic producers. At any lower level of duty, the benefits to the very few domestic producers supplying only the Canadian market would diminish, as would the burden to users. Because of the very high export-orientation of the industry, it is clear that an any level of protection, the main beneficiary of any additional cost is government. Such costs are borne by the user, and they are of no benefit to the majority of domestic producers.

There remains the possibility of establishing average rates of duty that reflect the differences in rates among product groups. In other words, the applicable rate on mainframes could be set at the average rate of 10.1 p.c. M.F.N., peripherals at 12.2 p.c. M.F.N., related telecommunications equipment at 16.7 p.c. M.F.N. This would be much more in keeping with current rates of duty than would an overall average. However, the segregation of the nomenclature to accommodate product groups poses difficulties, while also negating the logic of the systems concept. Although the spread in average rates of duty between mainframes and peripherals is not great, there is a considerable difference between the average rates for these product groups and for related telecommunications equipment. While average rates of duty by product group would reflect current levels of protection to a greater extent than an overall average, they would still not match prevailing product-by-product rates of duty.

On the basis of several considerations, protection could be provided to computing equipment of a class or kind made in Canada only, while allowing free entry to computing equipment not produced in Canada. There are a number of methods by which this objective could be achieved, including the specific enumeration of those devices produced in Canada, and the attachment of conditional clauses to the nomenclature.

The main advantages of this variation of the protection model are considered to be the following:

- it would permit duty-free entry to those products not requiring protection, thereby benefiting users and encouraging them, by means of lower prices, to acquire more modern equipment;

- it would obviate the need to specify in the tariff which products are protected, thereby maintaining a current nomenclature, and one that allows for the protection of new types of Canadian products;

- it would continue to provide a level of protection for domestic producers catering to the Canadian market.

A class or kind provision has the following disadvantages:

- its provisions pose severe questions of judgment concerning product equivalence in respect of computing equipment;

- problems of administration are involved in maintaining current information on products made or not made in Canada, including both new products and those no longer in production;

- because the industry is heavily export-oriented, only very few of the products made in Canada have any cause for requiring protection;

- it would probably not encourage production of computing equipment not being produced at present in Canada.

The question of product equivalence requires elaboration. It has been shown that problems of incompatibility are present among competing systems of equipment. These problems would undoubtedly arise under "class or kind made/not made in Canada" clauses. In some instances, the determination as to whether an imported product is of a class or kind made in Canada might be straightforward. Stand-alone peripherals, for example, probably involve few questions of compatibility or product equivalence. In many other instances, however, such as with CRT terminals, the question of whether a Canadian manufactured terminal is equivalent to, and a substitute for, other imported CRT terminals involves highly technical considerations, as well as questions relating to the particular market being served and its size.

While these difficulties may appear formidable, it must be acknowledged that a similar scheme has been in operation for some time under the Machinery Program relating to the remission of duties for computing equipment and parts classified in tariff item 42700-1. Under this program, similar determinations are made as to whether the goods are available or not from production in Canada. This suggests that the difficulties are not insurmountable. However, with a class or kind provision in the new tariff item(s), most or all computing equipment would be classified thereunder, which would amount to about twice the volume and several times the variety of computing equipment entering under tariff item 42700-1. Furthermore, it has come to the Board's attention that certain imports may be granted remission of duties even when Canadian production of the product in question is available. This tends to cast doubt on the purpose of, and need for, qualified protection in the specific situations in which it is meant to apply.

Another alternative is to levy a duty on all imports of computing equipment entering under the new tariff item, and to allow Canadian manufacturers to "earn" remission of the duties paid on the basis of some performance criterion related to the volume of Canadian production. For instance duties might be remitted on the value of imports equal to the amount of the increase in the value added by production of computing equipment in Canada above that in a given base year. The objective of an earned duty remission program is to increase Canadian output through greater international rationalization and specialization. The remitted duties would offset the higher costs of Canadian production on sales outside the domestic market. It is readily apparent that in such a program the firms with a sizable Canadian computing equipment manufacturing base and an opportunity for international rationalization are most likely to benefit; this would be primarily multinationals.

The advantages of the earned duty remission program are considered by the Board to be as follows:

- it would tend to promote the establishment of new production facilities and resources by firms solely importing equipment, and the expansion of production facilities and resources by firms importing more equipment than they are producing in Canada;

- to the extent that the model was successful, it might reduce unit hardware costs to users by the amount of earned duty remissions;

- it may offer domestic parts producers greater supply opportunities brought about by increased domestic production of equipment;

- it would tend to improve Canada's visible trade balance in computing equipment.

The disadvantages are seen to include the following:

- it is not clear why an earned duty remission model should have any greater success than present tariffs in encouraging production in Canada, particularly as industry spokesmen have stated that tariffs per se have not fostered production;

- it would most likely be of benefit to those firms having U.S. corporate affiliates, and might encourage the takeover of Canadian-owned firms by foreign companies;

- most of the firms which might stand to benefit have already largely rationalized their production;

- it would expose the products made by Canadian-owned equipment manufacturers to greater competition.

The earned duty remission model appears to be based largely on the premise that the rationalization and specialization of production of computing equipment is beneficial and should be encouraged. While this argument has merit, it is apparent that the main beneficiaries would be the multinationals with opportunities to supply affiliates with production inputs or finished goods for sale. Few, if any, Canadian-owned producers have foreign affiliates with which to rationalize their production. Moreover it should be noted that international rationalization and specialization, an objective of this scheme, demonstrated by high and increasing volumes of imports and exports, has already been realized to a very great extent.

The rationale for duty-free entry of computing equipment and parts into Canada is based on a combination of premises which suggests that duties have been of very little or no consequence to this industry and should be abandoned. In particular, it has been suggested that duties have not encouraged domestic production; that they have probably made a number of Canadian producers inefficient; that the export orientation of the industry demonstrates their inappropriateness; and that Canadian users have been required to pay more for their equipment than was necessary.

For the most part, the findings of this Reference tend to substantiate these premises. Imports of computing equipment and parts supply as much as 90 per cent or more of the domestic market, and the tariff appears not to have been effective in restricting imports. At the same time, more than 85 per cent of Canadian production is exported,

indicating that the probable higher cost of Canadian manufacturing is compensated for by means other than the tariff. Federal government financial assistance has been an important factor in effectively offsetting some of the costs of production - to the extent of about 7 per cent in 1972. Both the market for, and production of, computing equipment in Canada are dominated by U.S.-based multinational enterprises. Independent Canadian-owned producers, while they have had some success in producing and marketing a few items of equipment, are not in a position to challenge this dominance.

The main advantages of duty-free entry are as follows:

- it would not result in any significant decline in the volume of computing equipment being produced in Canada;

- prices to users would be reduced by about 4 per cent on average, thereby encouraging the use of more modern equipment for greater efficiency;

- it would place the Canadian computer services industry in a more competitive position vis-à-vis its U.S. counterpart;

- it would enable the producer of equipment for the domestic market to benefit by as much as 7 per cent of the factory costs of production from the duty-free imports of parts;

- it would enable exporters of equipment to benefit from the elimination of financial and administrative costs associated with duty drawbacks on imported parts, and would reduce the government's administrative costs associated with drawback claims, and with duty remission under tariff item 42700-1;

- it would provide the framework for the Canadian-owned computing equipment industry to become more internationally competitive.

The main disadvantage of duty-free entry is that it would provide no protection for Canadian independent equipment producers catering solely to the domestic market.

The arguments for and against duty-free entry of computing equipment and parts divide broadly into two categories: those relating to user benefits, and those relating to effects on production. Where the general user is concerned, the incidence of the duty is perhaps of marginal significance because computing equipment costs rarely exceed 1 per cent of their business revenues or institutional budgets. On the other hand, considered in isolation, a 4 per cent reduction in the cost of equipment cannot be dismissed lightly. Where service bureaux are concerned, duty-free entry would have a much greater impact. It was shown in Chapter IX that the incidence of the duty alone was slightly in excess of 1 per cent on average of total service bureau revenues. However, service bureaux generally tend to operate larger-than-average systems of equipment, so that the incidence of duty, including its incremental effect on federal and provincial sales taxes, may be as much as 2 or 3 per cent of total service bureau revenues.

Where the production of computing equipment and parts are concerned, over 92 per cent in 1972 was accounted for by foreign-owned companies, almost all of which proposed duty-free entry or an earned-remission program. Of the 7 or 8 per cent of production accounted for by Canadian-owned firms, 58 per cent was exported. Thus, the domestically-retained production by Canadian-owned firms that requires protection, bearing in mind the duty-free provisions of tariff item 69605-1, amounts to no more than 2 or 3 per cent of the total value of Canadian production. In terms of specific products, this production includes certain CRT display terminals, two models of teletypewriters, modems, and possibly other related telecommunication devices. One further point of significance is that, while it may be possible to isolate particular products for special tariff treatment, they are vulnerable to technological obsolescence. Products priced up to the tariff therefore face the prospect of competing against lower-priced substitutes, particularly in the long term.

Parts

The outstanding feature relating to rates of duty considerations with respect to parts is the effect of duty drawbacks. It has been noted several times that the application of duty drawbacks on parts incorporated in exported products effectively reduces to an insignificant level, the rate of duty paid. The protection afforded domestic parts producers applies to most but not all of the production parts incorporated into units of equipment produced in Canada for the Canadian market; these account for a small proportion of total domestic production.

The Board's survey of the industry shows that an average of 87 per cent of the value of production is exported, and that about 13 per cent is retained for the domestic market. Even parts used in the equipment retained for the domestic market are not all protected because of sales to duty-exempt institutional users. The provisions of tariff item 69605-1 enable finished product suppliers to draw back duties paid on parts incorporated into products sold to eligible users. These sales may account for as much as 20 per cent of domestic sales; therefore, the protected parts market can amount to only the value of the parts involved in about 10 per cent of the total value of Canadian production (13 per cent domestically-retained production, less 20 per cent institutional sales). Moreover, of domestically-retained production, about three-quarters is undertaken by foreign-owned producers, and less than one-quarter, or a little over 3 per cent of total Canadian production, by Canadian-owned producers. Because of the structure of the industry, it is probable that the market for parts produced by Canadian-owned companies is that which is represented by the finished products of Canadian-owned equipment manufacturers. Therefore, the protected parts market open to Canadian-owned parts manufacturers is likely to be much smaller than the proportion of domestically-retained production, perhaps as little as 2 or 3 per cent of the total value of Canadian computing equipment and parts production. It can be seen that the duty on computing equipment parts protects only a very small proportion of parts used in the manufacture of finished products. The fact that the industry is highly export-oriented limits the extent to which Canadian parts producers can be

protected, and because Canadian-owned computing equipment manufacturers supply a relatively greater proportion of the domestic market, duties on parts have a relatively greater adverse effect on them than on foreign-owned computing equipment manufacturers. A finished product manufacturer who is entirely reliant on the domestic market suffers the greatest disadvantage with respect to duties on parts.

At any level of protection, parts can be protected only to the extent of the value of parts used in about 10 per cent of the value of production of computing equipment in Canada. A rate of duty of 15 p.c., close to the weighted average duty of 14.4 p.c. on parts imports in 1972, would therefore be of benefit to domestic parts producers only with respect to parts incorporated in domestically-retained products. This small volume is almost certainly insufficient to provide a viable production base for domestic parts producers; at most, it may enable a few producers to obtain marginally higher prices on some portion of their parts production. Even this is doubtful unless the parts producer can identify a product manufacturer catering solely to the domestic market and can obtain from him a parts supply contract. If a finished goods manufacturer begins to export any portion of his production, it is probably to his advantage to buy imported, rather than domestically-manufactured parts because he can obtain duty drawbacks on the portion that is subsequently exported. Having made a commitment to imported parts, it is highly unlikely that the domestic equipment producer would also use equivalent domestically-manufactured parts solely for his domestically-retained products. The parts protection model, therefore, suffers from the acute disadvantage that such a small portion of potential domestic parts production is susceptible to protection in this internationally-organized industry.

As with finished goods protection for parts could be provided only to those of a class or kind made in Canada. In this circumstance, parts not made in Canada would be permitted duty-free entry. It is evident, however, that the above comments apply also to any conditional protection arrangement; because even though a particular part may be manufactured in Canada, its imported equivalent which is incorporated in an exported finished product would still be subject to duty drawback. The main advantage with this variation of protection is that it would obviate the need for a certain proportion of duty drawback claims, and would result in some administrative savings for finished goods producers. Apart from the small value of parts subject to protection, the main disadvantages of a "made/not made in Canada" clause is that it poses severe administrative problems concerning parts equivalence; these problems are conceivably more acute than with finished products. From another viewpoint, it would be virtually impossible to determine which parts require protection, as the same parts which are used in products for the domestic market are undoubtedly used in exported products, which are then subject to duty drawback.

The rationale for duty-free entry for parts is based primarily on the fact that some 90 per cent of parts used by the domestic computer hardware industry is not finally subject to any level of tariff protection because of the high export orientation of the industry. The main advantages of duty-free entry for parts include the fact that it would obviate the costs and the difficulties involved in the claiming of duty drawbacks by finished goods producers, and the processing of such claims by government; it would tend to reduce the costs of domestically-retained

products to users; and it would make the finished goods producers who cater solely to the domestic market more competitive. The prime disadvantage of duty-free entry for parts is that it would provide no protection for domestic parts manufacturers for the parts supplied to that portion of computer hardware production that is retained in the domestic market.

Other factors affecting domestic parts producers have been noted throughout the Report, including the lack of "demand-pull" by finished product manufacturers; the presence of an apparently large number of proprietary parts in this industry; the existence of a very technologically-advanced parts manufacturing industry in the United States; and the existence of large, rationalized international producers of computing equipment with the ability to produce and source parts and subassemblies through affiliated companies. All of these factors combine to make it extremely difficult for domestic parts producers to supply the computer hardware industry with little but semi-fabricated components, materials and supplies. When these factors are considered in conjunction with the applicability of duty drawbacks on 90 per cent of parts used in domestically-manufactured products, it is apparent that domestic parts manufacturers receive very little or no benefit from the tariff.

OTHER TARIFF CONSIDERATIONS

Software

Computer software is not specifically provided for in the Canadian Customs Tariff, the BTN, nor the TSUS. The most usual form in which it is imported is as a magnetic tape or disk recording. Occasionally it is imported in the form of punched data cards or punched paper tape, and very rarely in the form of printed output(1) which is then available for retranscription. It can, of course, be transmitted from the country of origin by means of a communications line and recorded in Canada. Such a method avoids entry through Customs, and is one of the reasons why computer software is a "commodity" which can be subjected to tariff treatment only with difficulty.

Computer operating systems software(2) is the type of software that is of direct concern to this Reference because it is usually provided by the computer systems supplier included in the price of the computer system. In general, a master copy of the operating systems software applicable to various sizes and types of system is retained

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(1) In some contexts, the output or printed results of the operation of a data processing program is referred to as software. This is also imported and exported, but is not under consideration in this Reference.

(2) See Chapter IX, p. 272, for a more complete description. A rough demarcation can be drawn between applications software - the programs to solve a particular task - and computer operating systems software, which includes those programs designed to make a particular computer system operable. Applications software, because it is normally sold or rented separately from equipment, is not under consideration in this Reference.

at the Canadian supplier's headquarters, and when a system is installed, a duplicate of the appropriate master copy is delivered to the customer. A single customs entry, therefore, may account for just the master copy from which many other copies will be made, depending on the number of Canadian installations of the system in question.

The question of software valuation is at the centre of the difficulties surrounding its tariff treatment. Although generally included in the price of equipment, the base over which its costs will be apportioned cannot be known in advance. A further complication would be the necessity for apportioning these costs not merely to the systems concerned, but also to particular units of equipment which may be imported separately. A value for duty ruling based on the equipment list price in the country of origin presumably takes all or some portion of the value of computer operating systems software into account, whereas a ruling based on the manufacturing cost of equipment does not. It is apparent, therefore, that software that is included in the price of equipment can be indirectly accommodated by an equipment tariff item if the value for duty is based on, or is derived from the list price in the country of origin. This may be a more effective method of dealing with a service-type commodity as complex as computer operating systems software, than to prescribe a separate tariff item which could be circumvented.

It is noteworthy in this regard that computer operating systems software is designed originally in conjunction with the design of computer hardware, and this most often implies an undertaking at the head offices or software laboratories of the computing equipment manufacturers. To apply any rate of duty and/or sales tax directly on this software would imply the existence of a Canadian industry capable of supplying, or having the opportunity to supply, such software. To the Board's knowledge no independent Canadian firms are in this position. Consequently, no need is seen for the creation of a computer operating systems software tariff item, either separately or in conjunction with a hardware tariff item.

CHAPTER XI: RECOMMENDATIONS

CHAPTER XI: RECOMMENDATIONS

INTRODUCTION

This final chapter of the Report presents in condensed form and by subject the findings of the Board as regards the computing equipment industry in Canada, followed in each case by the Board's recommendations which flow therefrom. The chapter concludes with the tariff nomenclature and rates of duty which the Board deems appropriate for the industry.

It should be noted that the findings and recommendations of the Board are not based solely on public data, or on information received by the Board at public sittings. Subsequently extensive information of both a confidential and non-confidential nature was obtained by the Board and its staff in accordance with the provisions of the Tariff Board Act.

In broad terms, the Board is recommending duty-free entry for data processing and related telecommunications equipment and for articles and materials which enter into the manufacture of such equipment. There are exceptions, however, to this general statement including, inter alia, the tariff treatment of data processing media and certain end-use items.

The Board is also recommending two new tariff items, designed specifically for the industry.

The recommendations of the Board in respect of both nomenclature and rates tend, in a general way, to conform to the suggestions made by a majority of the producer and user organizations which made representations to the Board during the period of the enquiry.

Current Tariff Treatment

The lack of specific provisions for computing equipment and parts in the Customs Tariff has resulted in the use of a large number of tariff items which are generally ill-suited to the classification of this equipment. This has been the cause of classification problems, of inequities, and of high administrative costs for industry and government. While it would be possible to accommodate this equipment by amending currently-used tariff items, the Board concludes that this would not provide a viable, long-term solution to the problem which is central to this Reference.

> *The Board recommends, therefore, that new tariff items designed specifically for the accommodation of computing equipment and parts be incorporated in the Canadian Customs Tariff.*

Equipment Tariff Nomenclature

There is a very large number of products encompassed by this Reference. New products are introduced by the industry at frequent intervals, giving rise to new uses and new terminologies. These developments pose difficulties in establishing tariff nomenclatures that remain current. Although there is no single phrase that encompasses

this equipment precisely and exclusively, the Board believes that there is a sufficiency of well-recognized terms which together adequately describe the equipment under review. A broadly-worded tariff item, the Board concludes, is preferable to a specific nomenclature that would quickly tend to become outdated by technological advancements.

The adoption of a broadly-worded tariff item, however, may raise questions as to whether particular products are in fact provided for in certain instances. While the intent of a general terminology can be made clear, and its applicability for the vast majority of customs entries can be apparent, there may well be a few occasions when classification uncertainties arise. These, in the Board's view, cannot be completely avoided because of the ever-changing nature and technical complexity of this type of equipment. They represent small risks that are inherent in the adoption of a broadly-worded tariff item but are made acceptable by the advantages gained. Classification uncertainties may ultimately require resolution by interpretation; nevertheless, the Board concludes that it would be useful for the industry and the Department of National Revenue, Customs and Excise to be guided by a listing of equipment which holds promise of maintaining its currency. Such a list has been prepared by the Standards Division of Statistics Canada, with the assistance of a number of firms within the industry and various federal government departments, and appears as Appendix E to this Report.

The Board recommends, therefore, that a new tariff item for computing equipment be worded as follows:

1. *Electronic data processing machines and apparatus and units thereof; peripheral equipment for use therewith, including related teleprocessing machines and apparatus, teletypewriters, data entry, data preparation and data handling machines and apparatus; accessories and attachments for use therewith; all the foregoing whether or not otherwise provided for in Schedule "A" excluding tariff items 69605-1 and 69610-1.*

Parts Tariff Nomenclature

The very high export orientation of the computing equipment industry in Canada means that the duties paid on most production inputs can be drawn back. The Canadian parts industry, therefore, when supplying manufacturers of computing equipment, must compete in large measure at prevailing international prices without the benefit of tariff protection. This situation will continue to prevail whether or not amendments are made to the existing tariff structure. Because the level of the tariff in this situation is not of paramount importance, it is possible for both the domestic computing equipment industry and the government to derive significant administrative benefits from the classification of all production inputs in a single tariff item.

The Board recommends, therefore, that the phrase "parts of the foregoing" be appended to the computing equipment tariff item recommended above in order to accommodate replacement parts.

The Board further recommends that a new tariff item to accommodate production inputs be worded as follows:

2. Parts, whether finished or not, and materials for use in the manufacture of the goods enumerated in tariff item 1, when imported by manufacturers of such goods for use in their own factories.

Equipment Rates of Duty

It has been shown that the market for computing equipment in Canada is dominated, as are the markets in most other industrialized countries, by the products of a few multinationals, whose Canadian subsidiaries have largely adopted the practice of "rationalized" production whereby almost all of their production is exported to affiliated companies and most of their production inputs and finished products for sale in Canada are imported from their foreign affiliates. Even Canadian-owned firms, which account for less than 10 per cent of the value of Canadian production, import much of their production inputs and exports almost 60 per cent of their production. So far as the products under review are concerned, it could be said that Canada generally exports what it produces and imports what it uses.

Given the pattern that characterizes the Canadian computing equipment industry, the Board has carefully weighed the available evidence and concludes that the tariff has had very little effect in restricting imports, supporting a viable Canadian-owned industry, or in influencing production location decisions. The latter have been based, the Board believes, much more on the need to preserve and enhance a company's position in the Canadian market, and on Canadian government support. In spite of the presence of tariffs, both Canadian and foreign, production rationalization has continued to develop. This strongly implies that economies brought about by production rationalization and specialization have been given greater weight than tariff levels by the multinationals in pursuing their industrial strategies. Therefore, the Board believes that Canadian market requirements will continue to be met almost entirely by imports. A prohibitive rate of duty on computing equipment might tend to reverse the practice of rationalized production which, the Board concludes, would neither be practicable nor desirable.

The Board has found no evidence to support the need for a general level of tariff protection on all finished computer products. The bulk of the production of finished computer products in Canada is manufactured by firms not requiring tariff protection. To protect those few finished computer products manufactured by firms catering solely to the domestic market would so distort any scheme of protection as to make it insupportable.

The Board recommends, therefore, that the following rates of duty apply to tariff item 1, recommended above:

B.P. Tariff	*M.F.N. Tariff*	*General Tariff*
Free	*Free*	*25 p.c.*

Rates of Duty on Parts

All of the evidence available to the Board on the role played by Canadian parts manufacturers in supplying the Canadian computing equipment industry with production inputs suggests that the role has been minor, with most of the inputs supplied being of a semi-fabricated or low technology type. The Board is satisfied, however, that the overriding consideration as far as the tariff on parts is concerned that it is not a factor in the purchasing decisions of the Canadian computing equipment industry. This is because of the existence of the tariff drawback provisions applicable to parts incorporated in exported finished products. The very high proportion of products and assemblies exported, in contrast to the small volume of production retained for the domestic market, means that only 10 per cent or less of inputs used by this industry receive any final protection.

The Board concludes that Canadian parts manufacturers while facing many other obstacles in endeavouring to supply the Canadian computing equipment industry with production inputs, also face the virtual lack of any benefit derived from tariff protection. Their prices to this industry must therefore be internationally competitive. Given the prevailing pattern of production and trade in the Canadian computing equipment industry and the existing drawback provisions, the Board further concludes that Canadian parts manufacturers, in their capacity as suppliers of production inputs to this industry, are not now receiving and, for the above reasons, cannot receive any effective level of tariff protection.

Accordingly, the Board recommends that the following rates of duty apply to tariff item 2 recommended above:

B.P. Tariff	*M.F.N. Tariff*	*General Tariff*
Free	*Free*	*25 p.c.*

SUMMARY

The Board recommends the adoption of two new tariff items in the Canadian Customs Tariff: the first to accommodate computing equipment and replacement parts; the second to accommodate parts and other production inputs used in the manufacture of finished products. The Board recommends that their nomenclature and rates of duty be as follows:

1. *Electronic data processing machines and apparatus and units thereof; peripheral equipment for use therewith, including related teleprocessing machines and apparatus, teletypewriters, data entry, data preparation and data handling machines and apparatus; accessories and attachments for use therewith; parts of the foregoing; all the foregoing whether or not otherwise enumerated in Schedule "A" excluding tariff item 69605-1 and 69610-1 ....*

B.P. Tariff	*M.F.N. Tariff*	*General Tariff*
Free	*Free*	*25 p.c.*

2. *Parts, finished or not, and materials for use in the manufacture of the goods enumerated in tariff item 1, when imported by manufacturers of such goods for use in their own factories.*

B.P. Tariff	*M.F.N. Tariff*	*General Tariff*
Free	*Free*	*25 p.c.*

First Vice-Chairman

Member

Member

Member

Ottawa, March 3, 1977

LIST OF APPENDICES

Summary of Tariff Proposals Made to the Tariff Board

Submitted by	Proposed Tariff Item(s) and Nomenclature[a]	Proposed Rates of Duty[b] B.P.	M.F.N.	Gen.	Other Proposals or Comments
A. Equipment and Parts Suppliers					
Canadian Business Equipment Manufacturers Association Inc. (CBEMA)	1. Computers and related data processing machines and apparatus, support equipment designed and intended for use therewith, including magnetic tape units, sensor based input/output units, input/output typewriters, related teleprocessing machines and apparatus, reusable storage media, interconnecting cables, controls, accessories, and attachments; parts of all the foregoing...	Free	Free	25 p.c.	- Proposes consolidation of tariff items into two items, one for computers and related data processing equipment, including maintenance and repair parts in finished form, and the other for articles and materials used in the manufacture of computers and related processing equipment.
	2. Articles and materials that enter into the cost of manufacture of the goods enumerated in tariff item 1, proposed above ...	Free	Free	25 p.c.	- Recommends general purpose typewriters, not designed and intended for use with computers and allied equipment remain under their present tariff classification. Also, bookkeeping machines, calculators and other equipment included in the original tariff reference

Summary of Tariff Proposals Made to the Tariff Board

Submitted by	Proposed Tariff Item(s) and Nomenclature[a]	Proposed Rates of Duty[b] B.P.	M.F.N.	Gen.	Other Proposals or Comments
CBEMA (Cont.)					by the Minister of Finance, which do not fall within the recommended classifications, should continue in their respective tariff items. - No duty should be levied on software and no specific classification should be created.
Bell & Howell Canada Ltd.[c]	Tariff items 42700-1 and 46200-1	Support CPTA proposed rates in Ref. 147.			- Draws attention to these tariff items as applicable to imports of certain photographic products.
	Tariff item 44538-1 Tape recorders with tape playback facility, and units with tape playback facility only	5 p.c.	5 p.c.	25 p.c.	- Requests reduced duty rates for tariff items 44538-1 and 44533-1. Suggests these products are of a class or kind not made in Canada.
	Tariff item 44533-1 Tape recorders with playback facility, plus radio features	Free	5 p.c.	25 p.c.	

Summary of Tariff Proposals Made to the Tariff Board

Submitted by	Proposed Tariff Item(s) and Nomenclature[a]	Proposed Rates of Duty[b] B.P.	M.F.N.	Gen.	Other Proposals of Comments
Burroughs Business Machines Ltd.(d)	1. Computers and related data processing machines and apparatus ... (Same as CBEMA)	Free	Free	25 p.c.	- Supports CBEMA brief.
		(Same as CBEMA)			
	2. Articles and materials ... (Same as CBEMA)	Free	Free	25 p.c.	
		(Same as CBEMA)			
Canadian National Railway - Canadian Pacific Railway (CN-CP Tele-communications)(c)	Tariff item 44506-1 Amend the item to provide for: Heavy duty teletypewriters, teleprinter equipment and component parts of a class or kind not available from Canadian production	-	Free	-	- Amend tariff item 44506-1 telegraph apparatus to provide for duty-free entry of heavy duty teletypewriters and teleprinter equipment, and component parts, of a class or kind not manufactured in Canada.

Summary of Tariff Proposals Made to the Tariff Board

Submitted by	Proposed Tariff Item(s) and Nomenclature [a]	Proposed Rates of Duty [b] B.P.	M.F.N.	Gen.	Other Proposals or Comments
Canadian Photographic Trade Association (CPTA) [c]	No specific proposal for Reference 150. For Reference 147 Photographic Equipment, CPTA recommended:	No specific proposal for Reference 150.			- Suggest that Brussels Nomenclature be used in defining the items covered by Tariff Board Reference 150.
	(Tariff item) 49029-3 "Microfilm readers and printers and any combination thereof; microfilming apparatus designed specifically to transfer or create images from documents, computer print-outs or computer digital output, onto microfilm rolls, cartridge film, camera cards or microfiche; microfilm processing apparatus; microfilming processing apparatus; parts, accessories and/or attachments, cases and containers for all of the foregoing."	Free	Free	10 p.c.	- Concerned with possible conflicts between equipment covered by Reference 147 and 150, and particularly tariff items 46200-1 and 46241-1. The equipment potentially at issue is computer output microfilm (COM) devices.

Summary of Tariff Proposals Made to the Tariff Board

Submitted by	Proposed Tariff Item(s) and Nomenclature[a]	Proposed Rates of Duty[b] B.P.	M.F.N.	Gen.	Other Proposals or Comments
Comterm Limited[c]	(a) All computer and related telecommunications equipment should be classified under a single tariff item.				- Computer and related telecommunications products for which a similar product is not manufactured in Canada should be admitted duty-free. Otherwise, duty should be charged regardless of the use to which the equipment will be put. (e.g., commercial, government, educational, research, etc.).
	All of the foregoing:				
	(b) Of a class or kind not made in Canada	Free	Free	-	
	Of a class or kind made in Canada	Duty should be charged.			- Products would be considered as made in Canada if (1) the manufacturer was at least 67% Canadian-owned; (2) at least 67% of manufacturing costs consist of (a) Canadian labour, (b) parts made in Canada, and (c) parts not made in Canada and for which similar parts not available from Canadian manufacturers.

Summary of Tariff Proposals Made to the Tariff Board

Submitted by	Proposed Tariff Item(s) and Nomenclature [a]	Proposed Rates of Duty [b] B.P.	M.F.N.	Gen.	Other Proposals or Comments
Datagen of Canada Ltd. [c]	No specific proposal.	1. Retain present rates of duty on computers. 2. Reduce or eliminate duty on components.			- The cost of handling duty drawbacks on imported components adds to the cost of manufacture in Canada. - No organization should be allowed to purchase computer equipment duty-free.
Digital Equipment of Canada Ltd. [c]	No specific proposal.	-	10 p.c.	-	- Suggest separate tariff items for computers, peripherals, related telecommunications equipment and parts. - Generate concise, descriptive definitions for computers, related telecommunications equipment and parts.

Summary of Tariff Proposals Made to the Tariff Board

Submitted by	Proposed Tariff Item(s) and Nomenclature[a]	Proposed Rates of Duty[b] B.P.	M.F.N.	Gen.	Other Proposals or Comments
Digital Equipment of Canada Ltd. (Cont.)					- A definition of computer should contain a read-write memory of at least 4,096 words, with minimum word length of 8 bits; an arithmetic processing unit capable of accepting data and instructions from the memory; and essential electronics for accepting data and instructions from peripheral devices. - To avoid the current conflict, where computer peripherals such as digital magnetic tape units, and other magnetic recording devices are protected by duties which were intended for home entertainment devices, it appears necessary to list a series of such devices which are usable with a computer, within the current technology.

Summary of Tariff Proposals Made to the Tariff Board

Submitted by	Proposed Tariff Item(s) and Nomenclature[a]	Proposed Rates of Duty[b] B.P.	M.F.N.	Gen.	Other Proposals or Comments
Digital Equipment of Canada Ltd. (Cont.)					- The identification of paper tape readers and punches, digital magnetic tape units, magnetic disks, CRT displays, teleprinters and keyboards would cover most of the conventional peripherals. - Parts for computers and peripherals used exclusively in a computer system should be defined. - Related telecommunications equipment should be broken down into two broad categories -- electronic and mechanical. Electronic equipment should carry the same rates of duty as those applicable to computers and peripherals, and mechanical equipment should be considered by the Dept. of I.T. & C. as a part of the machinery program. - N.O.P. should not be used in administration of the Customs Tariff.

Summary of Tariff Proposals Made to the Tariff Board

Submitted by	Proposed Tariff Item(s) and Nomenclature[a]	Proposed Rates of Duty[b] B.P.	M.F.N.	Gen.	Other Proposals or Comments
Electronics Industries Association of Canada. (EIAC)[c]	1. Data processing apparatus and related telecommunications equipment, accessories, and attachments for use therewith;				- Interpretation rules are required for the new computer tariff item similar to rules preceding Group XII of Schedule A to Customs Tariff.
	2. Parts, assemblies, and sub-assemblies of the foregoing, n.o.p;				- Wants to retain present tariff items enumerating certain components "eo nomine", e.g., 44542-1 and 44544-1.
	All of the foregoing:				- Retain existing export drawback provisions to ensure that imposition of any duty will not be a hindrance to possible export business from Canada.
	(a) When of a class or kind not made in Canada	Free	Free	25 p.c.	
	(b) When of a class or kind made in Canada	15 p.c.	15 p.c.	25 p.c.	

Summary of Tariff Proposals Made to the Tariff Board

Submitted by	Proposed Tariff Item(s) and Nomenclature[(a)]	Proposed Rates of Duty[(b)] B.P.	M.F.N.	Gen.	Other Proposals or Comments
IBM Canada Ltd.[(d)]	1. Data processing machines and apparatus, support equipment designed for use therewith, including magnetic tape units, sensor based input/output units, input/output typewriters, related teleprocessing machines and apparatus, interconnecting cables, controls, accessories, and attachments; parts of all the foregoing.	Free	10 p.c.	25 p.c.	- Introduced "earned concept", under which the M.F.N. rate of duty on recommended item 1 would be Free, if earned and 10 p.c., if not earned. The "earned concept" would permit manufacturers to earn duty-free imports of data processing equipment equivalent to value of Canadian production. - Favour consolidation of tariff items. - Support CBEMA on software.
	2. Articles and materials that enter into the manufacture of the goods enumerated in tariff item 1, proposed above.	Free	Free	25 p.c.	- Recommended item 2 would avoid the present administrative difficulties associated with duty drawback.

Summary of Tariff Proposals Made to the Tariff Board

Submitted by	Proposed Tariff Item(s) and Nomenclature[(a)]	Proposed Rates of Duty[(b)] B.P.	M.F.N.	Gen.	Other Proposals or Comments
International Computers of Canada Limited (ICCL)[(d)]	No specific proposal.	Free	Free	25 p.c.	- Supports CBEMA recommendations on classification of tariff items, rates of duties and definition approach. - Until such time as free trade becomes a reality, ICCL would like to see the basis of valuation for duty and federal sales tax published and applied equitably to all importers of electronic data processing equipment.
Minnesota Mining and Manufacturing of Canada Limited (3M Company)[(d)]	No specific proposal.	No specific proposal.			- Supports CPTA's nomenclature and rates of duties on microfilm equipment proposed under Reference No. 147.

Summary of Tariff Proposals Made to the Tariff Board

Submitted by	Proposed Tariff Item(s) and Nomenclature[a]	Proposed Rates of Duty[b] B.P.	M.F.N.	Gen.	Other Proposals or Comments
The National Cash Register Company of Canada Limited[d] (now NCR Canada Ltd.)	1. Computers and related data processing machines and apparatus ... (Same as CBEMA)	-	7.5 p.c. to 10 p.c.	-	- Maintain some level of tariff protection as a negotiating position.
	2. Articles and materials ... (Same as CBEMA)	-	Free	-	- "Earned" remission of duties concept is realistic and beneficial to domestic production.
					- Canadian value added under any tariff remission formula should be clear in definition and should add meaningful higher-skilled employment in Canada.
					- When, in the long term, a zero tariff rate is established, other effective instruments should be employed by the federal government to stimulate the industry in Canada.
					- Tariff policy should be co-ordinated with other industrial policy instruments, including federal

Summary of Tariff Proposals Made to the Tariff Board

Submitted by	Proposed Tariff Item(s) and Nomenclature[a]	Proposed Rates of Duty[b] B.P.	M.F.N.	Gen.	Other Proposals or Comments
NCR Canada Ltd. (Cont.)					purchasing policies, to provide a climate which is more conducive to long-range planning and investment in the industry. Also, special consideration should be given to co-ordinating policies within the various departments and agencies.
Olivetti Canada Limited[d]	1. Computers and related data processing machines and apparatus ... (Same as CBEMA)	Free	Free	25 p.c.	- Supports CBEMA brief in its entirety so far as data processing and related telecommunications equipment is concerned. However, the company's main interest is in basic business machines i.e. typewriters, adding, calculating and bookkeeping machines and their parts.
		(Same as CBEMA)			
	2. Articles and materials ... (Same as CBEMA)	Free	Free	25 p.c.	
		(Same as CBEMA)			
	Tariff item 41400-1 Typewriters	Free	20 p.c.	25 p.c.	- Propose the retention of the present rates of duty on typewriters.
	Tariff item 41405-1 Parts of typewriters	Free	Free	-	- Request the tariff item be amended to include all parts and components for use in the manufacture of typewriters (i.e., motors, nuts, bolts, screws, pulleys, etc.).

Summary of Tariff Proposals Made to the Tariff Board

Submitted by	Proposed Tariff Item(s) and Nomenclature[a]	Proposed Rates of Duty[b] B.P.	M.F.N.	Gen.	Other Proposals or Comments
Olivetti Canada Limited (Cont.)	Tariff item 41415-1 Bookkeeping, calculating and invoicing machines and complete parts thereof, n.o.p.	Free	10 p.c.	-	- The present duty rates be retained for bookkeeping and calculating machines used as stand-alone units and as distinct from data processing systems.
	Tariff item 41420-1 Adding machines Tariff item 41425-1 Parts of adding machines	Free	10 p.c.	-	- Propose that either calculating machines, adding machines and parts and accessories thereof be dutiable under the same tariff item, or a new tariff item be created for adding machines and complete parts.
The Society of the Plastics Industry of Canada (SPIC)[c]	No specific proposal on equipment.	No specific proposal on equipment.			- Support the purpose of Ref. 150 to develop a tariff classification and rate structure compatible to today's requirements.
	Parts of plastic for computers and related telecommunications equipment.				- Suggest no changes in the rates of plastic parts available from Canadian sources. (Suggested item has same rates as 93907-1 plastic articles viz., 15 p.c. B.P., $17\frac{1}{2}$ p.c. M.F.N.).
	(a) When of a class or kind made in Canada.	15 p.c.	$17\frac{1}{2}$ p.c.	30 p.c.	
	(b) When of a class or kind not made in Canada.	Free	Free	Free	

Summary of Tariff Proposals Made to the Tariff Board

Submitted by	Proposed Tariff Item(s) and Nomenclature[a]	Proposed Rates of Duty[b] B.P.	M.F.N.	Gen.	Other Proposals or Comments
SPIC (Cont.)					- Suggests that the Board seriously consider recommending the adoption of the Brussels Nomenclature.
Sweda International & Monroe, The Calculator Co., Divisions of Litton Business Equipment Limited[c]	Tariff item 41430-1 Cash registers	Free	10 p.c.	30 p.c.	- Sweda International requests tariff item 41430-1 (cash registers) be considered as machinery of a class or kind not made in Canada; be extended to include "parts thereof"; and the rate of duty reduced from 20 p.c. B.P., 20 p.c. M.F.N., and 30 p.c. General to Free B.P., 10 p.c. M.F.N., and to remain at 30 p.c. General.
	Tariff item 42700-1	2½ p.c.	15 p.c.	35 p.c.	- Tariff item 42700-1 (Machines, n.o.p...) to remain as is.
	Tariff item 41415-1	Free	Free	25 p.c.	- Monroe requests that "n.o.p." be eliminated from tariff item 41415-1, and rates of duty reduced.

Summary of Tariff Proposals Made to the Tariff Board

Submitted by	Proposed Tariff Item(s) and Nomenclature[a]	Proposed Rates of Duty[b] B.P.	M.F.N.	Gen.	Other Proposals or Comments
Sperry-Rand Canada Limited, UNIVAC Division (now Sperry Univac Computer Systems)(d)	1. Computers and related data processing machines and apparatus ... (Same as CBEMA)	Free	Free	25 p.c.	- Supports CBEMA proposals entirely.
		(Same as CBEMA)			
	2. Articles and materials .... (Same as CBEMA)	Free	Free	25 p.c.	
		(Same as CBEMA)			
B. Related Telecommunications Equipment Suppliers					
GTE Automatic Electric (Canada) Ltd.(c)	(a) Finished products;	-	15 p.c.	-	- Recommends merging most or all of the tariff items being studied into one new tariff item for all finished products and a second new tariff item for parts when imported by manufacturers for use in the manufacture of such equipment.
	(b) Parts for use in manufacturing	-	Free	-	

Summary of Tariff Proposals Made to the Tariff Board

Submitted by	Proposed Tariff Item(s) and Nomenclature(a)	Proposed Rates of Duty(b) B.P.	M.F.N.	Gen.	Other Proposals or Comments
Northern Electric Company Limited(c) (now Northern Telecom Limited)	Automatic data processing machines and units thereof; attachments; accessories and components; (Subject to interpretive notes).	No specific proposal.			- Tariff treatment for products related to the data processing industry and the telecommunications industry must be differentiated.
	Tariff items 44544-1 and 44542-1(e)	No change proposed.			- Existing tariff items enumerating components "eo nomine" should remain unchanged, e.g., 44544-1 (transistors and other semiconductor devices) 44542-1 (electron tubes, except X-ray tubes).
	Tariff items 44506-1, 44508-1 and 44533-1	No change proposed.			- Existing tariff items 44506-1 (electric telegraph apparatus and complete parts thereof), 44508-1 (electric telephone apparatus and complete parts thereof), and 44533-1 (radio and television apparatus and parts thereof, n.o.p.) should remain unchanged as to description and rates of duty.

Summary of Tariff Proposals Made to the Tariff Board

Submitted by	Proposed Tariff Item(s) and Nomenclature[a]	Proposed Rates of Duty[b] B.P.	M.F.N.	Gen.	Other Proposals or Comments
Northern Electric Company Limited (Cont.)					- Recommends adoption of the Brussels Nomenclature. - Canada would be ill-advised to lower rates of duty on existing tariff items without concessions from trading partners.
Rosson Enterprises Ltd.[c]	Tariff items 44538-1 and 44539-1	Lower or remove rates of duty			- Lower or remove rates of duty for tariff item 44538-1 (recording equipment ...) and tariff item 44539-1 (Tape transport mechanisms ...).
C. Computer Leasing Companies					
Greyhound Computer of Canada Ltd.[c]	All used computing equipment	25 p.c.	25 p.c.	25 p.c.	- Reclassification of all computer equipment needed so that a given unit with a given function will be assessed consistently at the same tariff rate.

Summary of Tariff Proposals Made to the Tariff Board

Submitted by	Proposed Tariff Item(s) and Nomenclature [(a)]	Proposed Rates of Duty [(b)] B.P.	M.F.N.	Gen.	Other Proposals or Comments
Greyhound Computer of Canada Ltd. (Cont.)					- Major distinction between new and used equipment. Not in Canada's interest to become a dumping ground for used computer equipment. Recommend all used equipment be classified separately and tariff rate of 25 p.c. of market value be applied in all cases.
D. Users of Computing Equipment					
Canadian Association of Data Processing Service Organizations. (CADAPSO)	No specific proposal.	No specific proposal.			- Recommend a new consolidated tariff for all computers, related telecommunications equipment and attachments. - Recommend lowest possible rates consistent with any announced policy for

Summary of Tariff Proposals Made to the Tariff Board

Submitted by	Proposed Tariff Item(s) and Nomenclature (a)	Proposed Rates of Duty (b) B.P.	M.F.N.	Gen.	Other Proposals or Comments
CADAPSO (Cont.)					development of Canadian manufacturing. - Any duty levied should at all times, be assessed without distinction as to end-users.
The Canadian Life Insurance Association	No specific proposal.	Reduction in rates			- Supports the suggestion for a tariff schedule for data processing and related telecommunications equipment and a reduction in the rates of duty.
Canadian Petroleum Association (CPA)	(1) Computers and ancillary computer equipment of a class or kind available in Canada from Canadian manufacturers, under regulations prescribed by the Governor in Council and as listed in Memorandum D51; parts of the foregoing.	-	10 p.c.	15 p.c.	- Proposes the principle that computing equipment be permitted duty-free entry, except for individually named items which are available from Canadian sources. The list of named items available in Canada should be periodically revised and published under Customs "D" memoranda.

Summary of Tariff Proposals Made to the Tariff Board

Submitted by	Proposed Tariff Item(s) and Nomenclature[a]	Proposed Rates of Duty[b] B.P.	M.F.N.	Gen.	Other Proposals or Comments
CPA (Cont.)					
	(2) Computers and ancillary computer equipment including the following: central processing units and peripheral devices including storage and memory systems, online input devices, online output devices, offline equipment manufactured or modified for use with the central processing units, associated control equipment, all other computer equipment, n.o.p.; parts of the foregoing.	Free	Free	Free	- The wording of the proposed item should ensure that integrated parts of an item of computer equipment would enjoy the same tariff rate as the item itself. - New tariff classification should be sufficiently general to include future equipment.
	(3) Complete parts of computers and ancillary computer equipment, when imported by manufacturers of computer equipment for use in the manufacture of such computer equipment in their own factories.	Free	Free	Free	

Summary of Tariff Proposals Made to the Tariff Board

Submitted by	Proposed Tariff Item(s) and Nomenclature[a]	Proposed Rates of Duty[b] B.P.	M.F.N.	Gen.	Other Proposals or Comments
CPA (Cont.)	Tariff item 49104-1[e] Of a class or kind made in Canada	5 p.c.	10 p.c.	20 p.c.	- Recommends maintenance of tariff items 49104-1 and 419105-1 used exclusively for processing geophysical seismic data. These tariff items have been considered satisfactory for entry of such specialized computer equipment. Asks that any new tariff item be so worded that items 49104-1 and 49105-1 would continue to take precedence for the seismic playback computer equipment.
	Tariff item 49105-1[e] Of a class or kind not made in Canada	Free	Free	Free	
Infopro Limited	No specific proposal.	No specific proposal.			- Recommends that after negotiating with Canada's trading partners, tariffs on computers be phased out. - Concerned with tariff treatment accorded imported computer print-outs.

Summary of Tariff Proposals Made to the Tariff Board

Submitted by	Proposed Tariff Item(s) and Nomenclature(a)	Proposed Rates of Duty(b) B.P. M.F.N. Gen.	Other Proposals or Comments
Mr. J. M. Ardron, P. Eng.,	No specific proposal.	Graduated duties and rebates from first delivery of unit of equipment.	- Recommends new product registration, followed by increasing tariff rates and decreasing rebates on Canadian manufactured products from time of first delivery. - Suggests that time-dependent tariff/rebate philosophy would result in positive benefits for Canadian manufacturers, users, and the economy as a whole. - Believes such a scheme would avoid the difficulties of product categorization and tariff schedule revision.

(a) Wording and format of the proposed tariff items are the same as proposed by the interested parties. Full description of these items, as given in the Canadian Customs tariff schedule, appears in Chapter III.
(b) B.P. - British Preferential Tariff; M.F.N. - Most-Favoured-Nation Tariff; Gen. - General Tariff. Since the Tariff Board sittings, a fourth rate category has been added, G.P.T. - General Preferential Tariff.
(c) Non-member CBEMA Computer Group.
(d) Member CBEMA Computer Group.
(e) Not included in the tariff items referred to the Tariff Board by the Minister of Finance.

Source: Submissions to the Tariff Board on Reference 150.

Appendix B

Non-Relevant Tariff Items

Tariff Item No.	Articles Reported as Entered
17800-1	Advertising brochures
18100-1	Tabulating cards
18700-1	Microfilm
18702-1	Microfilm
19750-1	Carbonless paper
19800-1	Hardcopy paper
19900-1	Plotter chart paper; format tape
41245-1	Electros
41420-1 [a]	Adding machines
41425-1 [a]	Parts of adding machines
41445-1	(Tariff item expired 31/10/74
43120-1	Hand tools
44546-1 [a]	Photograph and chart transceivers
36240-1	Photocopiers
46241-1 [a]	Microfilm reader/printers
46300-1	Microfilm reader; autoviewer
47600-1	Medical electronics
47605-1	Electronsensitive paper
52305-1	Cotton ribbons
56300-1	Nylon ribbons
62200-1	Suit case kits
62300-1	Carrying cases; instrument cases
65810-1	Mylar tape
65811-1	Mylar tape
93212-1	Putty
93213-1	Ink
93708-1	Microfilm chemicals
93901-81	Epoxy
93902-82	Plastic film; polyethylene sheets
93907-1	Plastic cases; plastic ribbon

(a) Tariff items specifically referred to the Board.

Source: Minister's letter; The Customs Tariff and Amendments (Office Consolidation), Department of National Revenue Canada; Tariff Board Survey; Industry submissions and responses to Tariff Board questionnaire.

Appendix C

Computing Equipment Suppliers and Producers in Canada, 1972 and 1973

Company	Computing Equipment Supplied in Canada	Computing Equipment Manufactured in Canada	R & D in Canada	Location of Manufacturing/ R & D Facilities	Location of Canadian Head Office
Computer Mainframes and Systems					
* Ahearn & Sopher Ltd.	Mini-computers, peripherals, multiplexers, concentrators, modems	nil	nil	nil	Rexdale, Ont.
Boothe Computer Ltd.	Leased computers, peripherals	nil	nil	nil	Etobicoke, Ont.
Burroughs Business Machines Ltd.(a)	Computer systems, peripherals, data communications equipment	nil	nil	nil	Don Mills, Ont.
Canadian General Electric Co. Ltd.	Process control computers, modems, data communications equipment	Process control computers, modems(b)	Process control computers, modems	Peterborough, Ont.	Toronto, Ont.
Collins Radio Company of Canada Ltd.	Computers	nil	nil	nil	Toronto, Ont.
* Commetrics Ltd.	Mini-computers, peripherals, concentrators, modems, multiplexers	nil	nil	nil	St. Lambert, Que.
* Computer Resale Corp. Ltd.	Used computers, peripherals	nil	nil	nil	Scarborough, Ont.
Control Data Canada Ltd.(c)	Computer systems, peripherals, data communications equipment	Mainframes	Mainframes, software	Streetsville, Ont.	Willowdale, Ont.
* Crawford, Allan, Associates	Mini-computer systems, peripherals, acoustic couplers, modems	nil	nil	nil	Mississauga, Ont.
Datagen of Canada Ltd.	Mini-computers, peripherals	Mini-computer assembly(b)	nil	Hull, Que.	Hull, Que.

Appendix C (Cont.)

Company	Computing Equipment Supplied in Canada	Computing Equipment Manufactured in Canada	R & D in Canada	Location of Manufacturing/ R & D Facilities	Location of Canadian Head Office
Digital Equipment of Canada, Ltd.	Mini-computers, peripherals, data communications equipment	Mini-computer assembly, back panel wiring power supplies assembly[(b)]	nil	Kanata, Ont.[(c)]	Kanata, Ont.
Greyhound Computer of Canada Ltd.	Leased computers and peripherals	nil	nil		Toronto, Ont.
GTE Automatic Electric (Canada) Ltd.	Special purpose computers	Special purpose computers	Special purpose computers	Brockville, Ont.	Brockville, Ont.
Hewlett-Packard Canada Ltd.	Mini-computers, peripherals	nil	nil	nil	Pointe Claire, Que.
Honeywell Information Systems	Computer systems, peripherals, data communications equipment	Key-to-tape, computer cables, banking terminals[(b)]	nil	Bowmanville, Ont.	Willowdale, Ont.
IBM Canada Ltd.	Computer systems, peripherals, data communications equipment	Card punch/card verifiers	Data entry devices, software	Don Mills, Ont. Bromont, Que.[(c)]	Don Mills, Ont.
International Computers of Canada Ltd.	Computer systems, peripherals, data communications equipment	nil	nil	nil	Toronto, Ont.
Leasco Computer International Ltd.	Leased computers, peripherals	nil	nil	nil	Toronto, Ont.
MAI Canada Ltd.	Small accounting computer systems, peripherals	(see parts)	nil	nil	Markham, Ont.
* Megatronix Ltd.	Mini-computers, peripherals, acoustic couplers, modems, multiplexers, teleprinters	nil	nil	nil	Weston, Ont.
McBee Company	Small accounting computer systems, peripherals	nil	nil	nil	Toronto, Ont.

Company	Computing Equipment Supplied in Canada	Computing Equipment Manufactured in Canada	R & D in Canada	Location of Manufacturing/ R & D Facilities	Location of Canadian Head Office
Mohawk Data Sciences Canada Ltd.	Mini-computers, peripherals modems	Key-entry devices	nil	Markham, Ont.	Markham, Ont.
National Cash Register Company of Canada Ltd.(c)	Computer systems, peripherals	nil	nil	nil	Toronto, Ont.
Nixdorf Computer Inc.	Small accounting computer systems, peripherals, data communications equipment	nil	nil	nil	Markham, Ont.
* Northern Electric Co. Ltd.	Special purpose computers, modems, multiplexers	Special purpose computers, multiplexers modems	Special purpose computers, multiplexers, modems	Montreal, Que. Peterborough, Ont.	Montreal, Que.
Olivetti Canada Ltd.	Small accounting computer systems, peripherals, acoustic couplers, modems	nil	nil	nil	Don Mills, Ont.
* Parvac Corp. Ltd.	Mini-computers, peripherals	nil	nil	nil	Willowdale, Ont.
Philips Electronics Industries Ltd.	Small accounting computer systems, modems	nil	nil	nil	Toronto, Ont.
* RUF Computer Systems Ltd.	Small accounting computer systems	nil	nil	nil	Scarborough, Ont.
Selcan Ltd.	16-bit and 32-bit computers, peripherals	nil	nil	nil	Ottawa, Ont.
Singer Company of Canada	Small accounting computer systems, peripherals	nil	nil	nil	Willowdale, Ont.
Sperry Univac Computer Systems	Computer systems, peripherals, data communications equipment	(see parts)	nil	nil	Mississauga, Ont.

Appendix C (Cont.)

Company	Computing Equipment Supplied in Canada	Computing Equipment Manufactured in Canada	R & D in Canada	Location of Manufacturing/ R & D Facilities	Location of Canadian Head Office
Texas Instruments Inc.	Mini-computers, peripherals	nil	nil	nil	Richmond Hill, Ont.
TRW Data Systems	Business mini-computers, peripherals, acoustic couplers, modems	nil	nil	nil	Scarborough, Ont.
Varian Associates of Canada	Mini-computers, CRT display terminals, peripherals, concentrators	nil	nil	nil	Georgetown, Ont.
Wang Laboratories	Mini-computers, peripherals, acoustic couplers	nil	nil	nil	Don Mills, Ont.
Xerox of Canada Ltd.[(b)]	Computer systems	nil	nil	nil	Don Mills, Ont.
Peripheral Equipment					
Addressograph-Multigraph of Canada Ltd.	Terminals for electronic funds transfer and credit authorization	nil	nil	nil	Toronto, Ont.
* Alban Industries Ltd.	Controllers, disk drives, memory systems, light pens	nil	nil	nil	Vancouver, B.C.
Ampex of Canada Ltd.	Tape and disk drives, memory systems	nil	nil	nil	Rexdale, Ont.
* Ashworth Automation Ltd.	Medium speed line printers, card readers	nil	nil	nil	Don Mills, Ont.
Aviation Electric Ltd.	CRT terminals	nil	nil	nil	Montreal, Que.
* Barshaw Corporation	Add-on memory units, disk packs	nil	nil	nil	Dorval, Que.
* Bell Canada	Teleprinters, data communications equipment	nil	nil	nil	Montreal, Que.

Appendix C (Cont.)

Company	Computing Equipment Supplied in Canada	Computing Equipment Manufactured in Canada	R & D in Canada	Location of Manufacturing/ R & D Facilities	Location of Canadian Head Office
Bell & Howell Canada Ltd.	Optical mark readers; digital cassette recorders	nil	nil	nil	Downsview, Ont.
Bunker Ramo Corp.	CRT display terminals, banking terminals, modems	nil	nil	nil	Montreal, Que.
Business Systems Technology Ltd.	Add-on/replacement core memory	nil	nil	nil	Montreal, Que.
* CAE Electronics Ltd.	Acoustic couplers, modems, alphanumeric terminals	nil	nil	nil	Montreal, Que.
Cambridge Memories Canada Ltd.	Add-on main memories	nil	nil	nil	Rexdale, Ont.
Canada Linotype Ltd.	OCR Equipment	nil	nil	nil	Toronto, Ont.
* Cantronics Ltd.	Magnetic tape products, card readers	nil	nil	nil	Downsview, Ont.
Centronics Data Computer (Cda) Ltd.	Computer printers, teleprinters	nil	nil	nil	Mississauga, Ont.
CIG Canada Ltd.	Disk drives, memory systems	nil	nil	nil	Toronto, Ont.
Cincinnati Systems & Signals Ltd.	Optical scanners	nil	nil	nil	London, Ont.
Computer Machinery Canada Ltd.	Shared-processor data entry systems, remote batch terminals, printers	nil	nil	nil	Don Mills, Ont.
* Computer Resources Ltd.	Optical document and page reader systems	nil	nil	nil	Don Mills, Ont.

Company	Computing Equipment Supplied in Canada	Computing Equipment Manufactured in Canada	R & D in Canada	Location of Manufacturing/ R & D Facilities	Location of Canadian Head Office
Com Data (Canada) Corp.	Teletypewriters, data communications equipment	nil	nil	nil	Oak Ridges, Ont.
* Computec Data & Control Applications Ltd.	Data display terminals	nil	nil	nil	Mississauga, Ont.
* Computrex Centres Ltd.	CRT terminals, tape and disk drives, memory systems, modems	nil	nil	nil	Calgary, Alta.
* Comterm Ltd.	CRT display terminals, remote batch terminals, printers, multiplexers	Assembles remote batch terminals	Remote batch terminals	Pointe Claire, Que.	Pointe Claire, Que.
* Consolidated Computer Inc.(c)	Key/disk, key/drum, data entry systems	Key/disk, key/ drums, data entry systems	Key/disk, key/ drums, data entry systems	Ottawa, Ont.	Don Mills, Ont.
* Consumers Computing Ltd.	Remote batch terminals	nil	nil	nil	Willowdale, Ont.
* Dasco Data Products	Data cassettes, floppy disks	nil	nil	nil	Rexdale, Ont.
Data 100 Canada Ltd.	Remote batch terminals	nil	nil	nil	Don Mills, Ont.
Data Disc Inc.	CRT display terminals, disk memory systems	nil	nil	nil	Ottawa, Ont.
* Datagraphics	CRT display terminals, tape units, acoustic couplers, modems, multiplexers, printers, digital plotters, disk units	nil	nil	nil	Ottawa, Ont.
* Datamex Ltd.	Portable printers, acoustic couplers, modems	nil	nil	nil	Downsview, Ont.

Appendix C (Cont.)

Company	Computing Equipment Supplied in Canada	Computing Equipment Manufactured in Canada	R & D in Canada	Location of Manufacturing/ R & D Facilities	Location of Canadian Head Office
* Datanetics Ltd.	Interactive graphic display systems and terminals	nil	nil	nil	Montreal, Que.
Decision Data Computer (Cda) Ltd.	Key punches, card sorters	nil	nil	nil	Toronto, Ont.
Eastman Kodak Co.	COM readers/ printers	nil	nil	nil	Toronto, Ont.
ECRM Inc.	OCR readers	nil	nil	nil	Pincourt, Que.
* Electro Design Ltd.	Paper tape readers, terminals, modems, multiplexers	nil	nil	nil	Ville la Salle, Que.
* Electronic Systems Ltd.	CRT terminals, tape units, modems, multiplexers, concentrators	nil	nil	nil	Downsview, Ont.
* Emco Ltd.	Programmable remote batch terminals	nil	nil	nil	London, Ont.
Entrex Canada Ltd.	Shared processors, key-to-disk data entry systems, disk units, tape units, printers	nil	nil	nil	Willowdale, Ont.
Ferranti-Packard Ltd.	Information display systems, OCR units	Alphanumeric display systems, OCR units	Alphanumeric display systems, OCR units	Toronto, Ont.	Toronto, Ont.
* Haliburton & White Limited	Data display terminals, optical mark readers	nil	nil	nil	Montreal, Que.
Harris Communications Systems (Canada) Ltd.	Programmable batch terminals, conversational terminals, controllers	nil	nil	nil	Don Mills, Ont.

Company	Computing Equipment Supplied in Canada	Computing Equipment Manufactured in Canada	R & D in Canada	Location of Manufacturing/ R & D Facilities	Location of Canadian Head Office
Indiana Steel Products Company of Canada Limited	Disk drives for mini-computers, add-on memories, memory products	nil	nil	nil	Kitchener, Ont.
Inforex Inc.	Shared processor, key/disk data entry systems	nil	nil	nil	Willowdale, Ont.
* Instronics Ltd.	Input/output devices, mini-computers, peripherals, modems, acoustic couplers, multiplexers	nil	nil	nil	Stittsville, Ont.
Itel Canada Ltd.	Disk drives, tape drives, add-on main memory	nil	nil	nil	Toronto, Ont.
* Leigh Instruments Ltd.	Alphagraphic printer/plotter	Alphagraphic printer/plotter	Alphagraphic printer/plotter	Ottawa, Ont.	Ottawa, Ont.
* Lektromedia, Ltd.	CRT terminals, concentrators	CRT terminals	CRT terminals	Pointe Claire, Que.	Pointe Claire, Que.
* LMC Data of Canada Ltd.	Terminals, acoustic couplers	nil	nil	nil	Dorval, Que.
Logicon Inc.	Peripheral equipment for IBM computers	nil	nil	nil	Montreal, Que.
3M Canada Ltd.	Disk packs, magnetic tape and cassette tape, COM recorders	nil	nil	nil	London, Ont.
* Marsland Engineering Ltd.	Teleprinters, intelligent terminals and systems	Teletypewriters	Teletypewriters	Waterloo, Ont.	Waterloo, Ont.
Memorex Canada Ltd.	Disk drives, COM recorders, modems	nil	nil	nil	Willowdale, Ont.
MGD Graphic Systems	OCR equipment	nil	nil	nil	Montreal, Que.

Company	Computing Equipment Supplied in Canada	Computing Equipment Manufactured in Canada	R & D in Canada	Location of Manufacturing/ R & D Facilities	Location of Canadian Head Office
* MICR Systems Ltd.	Microfilm recorders, reader/ printer	nil	nil	nil	Toronto, Ont.
Nashua Canada Ltd.	Disk packs	nil	nil	nil	Peterborough, Ont.
* NTI National Inc.	Magnetic tape cassette drives, magnetic card drives, CRT terminals	nil	nil	nil	Montreal, Que.
* Nucleonic Scientific	Cassette magnetic tape systems, floppy disk system	nil	nil	nil	Ottawa, Ont.
OCR Concepts Ltd.	OCR equipment	nil	nil	nil	Montreal, Que.
Optical Scanning Corp.	Optical mark and character readers	nil	nil	nil	Montreal, Que.
Potter Data Products Canada Ltd.	Tape and disk units, printers, terminals	nil	nil	nil	Don Mills, Ont.
* Pylon Electronic Development Co. Ltd.	OCR equipment	OCR equipment	OCR equipment	Lachine, Que.	Lachine, Que.
* Quantic Data Systems Ltd.	Printers, disk controllers, disk memory sub-systems	nil	nil	nil	Ottawa, Ont.
Recognition Equipment (Canada) Ltd.	OCR systems	nil	nil	nil	Don Mills, Ont.
* Sharp, I.P., Associates(d)	CRT terminals	Terminals	Terminals, software	Ottawa, Ont.	Toronto, Ont.
Storage Technology of Canada Ltd.	Tape drives, disk drives, add-on memory	nil	nil	nil	Etobicoke, Ont.

Appendix C (Cont.)

Company	Computing Equipment Supplied in Canada	Computing Equipment Manufactured in Canada	R & D in Canada	Location of Manufacturing/ R & D Facilities	Location of Canadian Head Office
Sycor International Ltd.	Programmable CRT display terminals, cassette tape units, modems	nil	nil	nil	Don Mills, Ont.
Syner-Data (Canada) Inc.	Teleprinters	nil	nil	nil	Weston, Ont.
Tab Products of Canada Ltd.	Key punch verifiers	nil	nil	nil	Don Mills, Ont.
Tektronix Canada Ltd.	Graphic CRT display terminals	nil	nil	nil	Pointe Claire, Que.
Teletype Corp.	Printer and keyboard/printer terminals, modems	nil	nil	nil	Toronto, Ont.
Telex Ltd.	Disk, magnetic tape drives, printers, main memory devices	nil	nil	nil	Don Mills, Ont.
* Tracan Electronic Corp.	CRT terminals	nil	nil	nil	Downsview, Ont.
* T-Scan Ltd.	OCR terminals	OCR terminals	OCR terminals	Scarborough, Ont.	Scarborough, Ont.
Westinghouse Canada Ltd.(c)	CRT terminals, alphanumeric displays	CRT terminals, alphanumeric displays	CRT terminals, alphanumeric displays	Hamilton, Ont.	Hamilton, Ont.
* Whittaker Electronics Ltd.	Disk systems, OCR equipment, tape units, acoustic couplers	nil	nil	nil	Ottawa, Ont.

Company	Computing Equipment Supplied in Canada	Computing Equipment Manufactured in Canada	R & D in Canada	Location of Manufacturing/ R & D Facilities	Location of Canadian Head Office
Related Telecommunications Equipment					
* Ace Office Equipment Ltd.	Modems, concentrators	nil	nil	nil	Montreal, Que.
* CN-CP Telecommunications	Concentrators, modems, multiplexers	nil	nil	nil	Toronto, Ont.
* Canteltech Ltd.	Acoustic couplers, modems, multiplexers	nil	nil	nil	Scarborough, Ont.
Computer Communications Inc.	Concentrators	nil	nil	nil	Don Mills, Ont.
* Domshy Industries Ltd.	Acoustic couplers, modems, multiplexers	nil	nil	nil	Calgary, Alta.
* Edmunde Newhall Associates	Modems, acoustic couplers	Modems	Modems	Rexdale, Ont.	Rexdale, Ont.
* ESE Ltd.	High speed digital modems, multiplexers, acoustic couplers	Modems	Modems	Rexdale, Ont.	Rexdale, Ont.
* Field, T.E., Associates	High speed modems, time division multiplexers	nil	nil	nil	Agincourt, Ont.
* Gandalf Data Communications Ltd.(c)	Modems, concentrators, multiplexers	Short distance modems	Short distance modems	Ottawa, Ont.	Ottawa, Ont.
General DataComm Ind. (Canada) Ltd.	Modems, multiplexers	nil	nil	nil	Montreal, Que.
GTE Lenkurt Electric (Canada) Ltd.	Modems, multiplexers	Modems, multiplexers	Modems, multiplexers	Burnaby, B.C.	Burnaby, B.C.

Company	Computing Equipment Supplied in Canada	Computing Equipment Manufactured in Canada	R & D in Canada	Location of Manufacturing/ R & D Facilities	Location of Canadian Head Office
* Hofstetter, M.P., Ltd.	Modems	nil	nil	nil	Downsview, Ont.
Litton Systems (Canada) Ltd.	Modems, multiplexers	nil	nil	nil	Toronto, Ont.
* Louis Albert Associates	Acoustic couplers, modems, multiplexers	nil	nil	nil	Ottawa, Ont.
* MacDonald, Dettwiler & Assoc. Ltd.	Concentrators, multiplexers	nil	nil	nil	Vancouver, B.C.
MI^2 Data Systems, Inc.	Acoustic couplers, modems	nil	nil	nil	Don Mills, Ont.
* ROR Associates Ltd.	Modems, multiplexers	nil	nil	nil	Scarborough, Ont.
Sangamo Electric Co.	Modems, multiplexers	nil	nil	nil	Toronto, Ont.
Siemens Canada Ltd.	Modems	nil	nil	nil	Pointe Claire, Que.
TMC (Canada) Ltd.	Concentrators, modems, multiplexers	nil	nil	nil	Ottawa, Ont.
* Uni-Tel Limited	Modems, multiplexers	nil	nil	nil	Scarborough, Ont.
Components, Parts and Subassemblies					
Aerovox Canada Ltd.		Capacitors, aluminum electrolytic Capacitors, tantalum electrolytic		Amherst, N.S.	Hamilton, Ont.
Amphenol Canada Ltd.		Cable, coaxial Connectors, for printed circuit board Connectors, input/output		Renfrew, Ont.	Scarborough, Ont.

Appendix C (Cont.)

Company	Computing Equipment Supplied in Canada	Computing Equipment Manufactured in Canada	R & D in Canada	Location of Manufacturing/ R & D Facilities	Location of Canadian Head Office
* AMP of Canada Ltd.		Connectors, power		Markham, Ont.	Markham, Ont.
ANRO Electronic Industries Ltd.		Inductors, iron core		nil	Toronto, Ont.
Aptec Engineering Ltd.		Cassette tape transport system		nil	Downsview, Ont.
* Audio Transformer Co. Ltd.		Inductors, iron core		Waterloo, Ont.	Waterloo, Ont.
Automatic Electric (Canada) Ltd.		Selectors, sequential Switches, stepping		nil	Toronto, Ont.
* Avionics Ltd.		Heat sinks, aluminum		Niagara-on-the Lake, Ont.	Niagara-on-the Lake, Ont.
Bayly Engineering Ltd.		Amplifiers, distribution and main line Amplifiers, multi-taps Amplifiers, video distribution for data display terminals Panels, computer back plane Panels, jack		Ajax, Ont.	Ajax, Ont.
* Beaconing, Optical & Precision Materials Co. Ltd.		Amplifiers, distribution and main line Amplifiers, multi-taps Amplifiers, video distribution for data display terminals Cable, harness		Granby, Que.	Montreal, Que.
* Bedard-Girard Ltd.		Power supply assemblies		Montreal, Que.	Montreal, Que.

Appendix C (Cont.)

Company	Computing Equipment Supplied in Canada	Computing Equipment Manufactured in Canada	R & D in Canada	Location of Manufacturing/ R & D Facilities	Location of Canadian Head Office
Boston Insulated Wire & Cable Co. Ltd.		Cable, harness Cable, multi-conductor		Hamilton, Ont.	Hamilton, Ont.
Burndy Canada Ltd.		Connectors, power Lugs, terminal		Scarborough, Ont.	Scarborough, Ont.
* Canada Wire & Cable Co. Ltd.		Cable, multi-conductor Cable, coaxial Cable, paired or multi-paired Wire, hook up		Saint John, N.B. Montreal, Que. Toronto, Simcoe & Fergus, Ont. Winnipeg, Man. Weyburn, Sask. New Westminster, B.C.	Toronto, Ont.
Canadian General Electric Co. Ltd.		Cable, multi-conductor Panels, jack Wire, hook up		Toronto, Ont.	Toronto, Ont.
Canadian Marconi Ltd.		Amplifiers, distribution and main line Amplifiers, multi-taps Amplifiers, video distribution for data display terminals Capacitor or capacitor/ resistor networks Power supply assemblies		Montreal, Que.	Montreal, Que.
* Canadian Research Institute		Power supply assemblies		Toronto, Ont.	Don Mills, Ont.
Capacitors of Canada (1968) Ltd.		Capacitors, aluminum, electrolytic Capacitors, tantalum electrolytic		Scarborough, Ont.	Scarborough, Ont.

Appendix C (Cont.)

Company	Computing Equipment Supplied in Canada	Computing Equipment Manufactured in Canada	R & D in Canada	Location of Manufacturing/ R & D Facilities	Location of Canadian Head Office
* Central Dynamics Ltd.		Amplifiers, distribution and main line Amplifiers, multi-taps Amplifiers, video distribution for data display terminals Converters, data interface Display tube, data Display, graphic Switches, video for display terminals		Pointe Claire, Que.	Pointe Claire, Que.
* Constanta Co. of Canada Ltd.		Resistors, all types of fixed, adjustable and variable		Montreal, Que.	Montreal, Que.
C.P. Clare of Canada Ltd.		Cable, harness		Toronto, Ont.	Toronto, Ont.
CTS of Canada Ltd.		Power supply assemblies Resistors, all types of fixed adjustable and variable		Streetsville, Ont.	Streetsville, Ont.
Dale Electronics Canada Ltd.		Resistors, all type of fixed, adjustable and variable		Scarborough, Ont.	Scarborough, Ont.
* Decor Metal Products Ltd.		Heat sinks, aluminum		Midland, Ont. Penetanguishene, Ont.	Midland, Ont.
Digital Equipment of Canada Ltd.		Panels, computer back plane Panels, jack		Kanata, Ont.[c]	Kanata, Ont.
Elco Connectors (Canada) Ltd.		Connectors for printed circuit boards		Toronto, Ont.	Toronto, Ont.

Appendix C (Cont.)

Company	Computing Equipment Supplied in Canada	Computing Equipment Manufactured in Canada	R & D in Canada	Location of Manufacturing/ R & D Facilities	Location of Canadian Head Office
* Electrohome Ltd.		Displays, data Displays, graphic		Kitchener, Ont.	Kitchener, Ont.
* Electronic Craftsmen		Inductors, iron core		Waterloo, Ont.	Waterloo, Ont.
Englehard Industries of Canada Ltd.		Contact, mercury wetted		Toronto, Ont.	Toronto, Ont.
* Epitek Electronics Ltd.		Capacitor or capacitor/ resistor networks Resistor or resistor/ capacitor networks		Ottawa, Ont.	Ottawa, Ont.
* Eric Marsland & Co.		Lugs, terminal		Kitchener, Ont.	Kitchener, Ont.
Esna Limited		Switches, stepping		Agincourt, Ont.	Agincourt, Ont.
* Fabricon Mfg. Ltd.		Cable, harness		Trenton, Ont.	Trenton, Ont.
* Fanon Electronics of Canada Ltd.		Amplifiers, distribution and main line Amplifiers, multi-taps Amplifiers, video distribution for data display terminals		Toronto, Ont.	Toronto, Ont.
Ferranti-Packard Limited		Display, data Display, graphic		Toronto, Ont.	Toronto, Ont.
Garrett Manufacturing Ltd.		Capacitor or capacitor/ resistor networks Resistor or resistor/ capacitor networks		Rexdale, Ont.	Rexdale, Ont.

Appendix C (Cont.)

Company	Computing Equipment Supplied in Canada	Computing Equipment Manufactured om Canada	R & D in Canada	Location of Manufacturing/ R & D Facilities	Location of Canadian Head Office
General Instrument of Canada Ltd.		Amplifiers, distribution and main line Amplifiers, multi-taps Amplifiers, video distribution for data display terminals Cable, harness		Toronto, Ont. Waterloo, Ont.	Mississauga, Ont.
* General Magnetic Products of Hawkesbury Ltd.		Inductors, iron core		Hawkesbury, Ont.	Hawkesbury, Ont.
Geo Space Canada		Digital magnetic recording heads disk memory systems Printed circuit boards		nil	Calgary, Alta.
GTE Lenkurt Electric (Canada) Ltd.		Selectors, sequential Sequential selectors		Rimouski, Que. Regina, Sask. Burnaby, B.C.	Burnaby, B.C.
Hamilton/Avnet Electronics		Semiconductor memories		nil	Toronto, Ont.
Helipot Canada		Resistors, all types of fixed, adjustable and variable		nil	Toronto, Ont.
Honeywell Ltd. (Honeywell Info. Systems)		Switches, lighted push-button Switches, stepping		Bowmanville, Ont.	Scarborough, Ont. Willowdale, Ont.
IBM Canada Ltd.		Integrated circuits[(b)]		Bromont, Que.	Don Mills, Ont.
International Rectifier Canada Ltd.		Heat sinks, aluminum		Scarborough, Ont.	Scarborough, Ont.
* International Systcoms Ltd.		Converters, data interfaces		Montreal, Que.	Montreal, Que.

Appendix C (Cont.)

Company	Computing Equipment Supplied in Canada	Computing Equipment Manufactured in Canada	R & D in Canada	Location of Manufacturing/ R & D Facilities	Location of Canadian Head Office
ITT Cannon Electric Canada		Connectors, for printed circuit boards Connectors, input/output Connectors, power Connectors, memory stack Panels, computer back plane Panels, jack		nil	Whitby, Ont.
Jarry Electronics Ltd.		Cable, harness Inductors, iron core		Hawkesbury, Ont.	Hawkesbury, Ont.
Johnson, Matthey & Mallory Ltd.		Capacitors, aluminum, electrolytic Capacitors, tantalum, electrolytic Contact, mercury wetted		St. Catharines, Ont. Woodstock, Ont. Toronto, Ont.	Toronto, Ont.
* Lacal Industries Ltd.		Connectors, power		Lachine, Que. Newmarket, Ont.	Newmarket, Ont.
* Magna Electronics Corp. Ltd.		Heat sinks, aluminum		Scarborough, Ont.	Scarborough, Ont.
MAI Canada Ltd.		Printed circuit boards	Printed circuit boards	Markham, Ont.	Markham, Ont.
* Marsland Engineering Ltd.		Inductors, iron core		Waterloo, Ont.	Waterloo, Ont.
* Microsystems International Ltd.		Circuits, digital bipolar(b) Circuits, linear bipolar(b) Semi conductor, metal oxide (MOS)(b) Memory, sub-systems, semi-conductors(b)		Ottawa, Ont.	Montreal, Que.

Appendix C (Cont.)

Company	Computing Equipment Supplied in Canada	Computing Equipment Manufactured in Canada	R & D in Canada	Location of Manufacturing/ R & D Facilities	Location of Canadian Head Office
* National Semiconductors Ltd.		Photodiodes		Montreal, Que.	Montreal, Que.
* North American Microcircuits Ltd.		Capacitor or capacitor/ resistor networks		Stoney Creek, Ont.	Stoney Creek, Ont.
* Northern Electric Co. Ltd.		Cable, multi-conductor Wire, hook up		Lachine, Que. Kingston, Ont.	Montreal, Que.
* Northern Radio Mfg. Co. Ltd.		Converters, data inter- face Data generators Selectors, sequential Power supply assemblies		Ottawa, Ont.	Ottawa, Ont.
* N. Slater Co.		Connectors, power		Hamilton, Ont.	Hamilton, Ont.
Phillips Cables Ltd.		Cable, paired or multi- paired Wire, hook up		Dartmouth, N.S. Rimouski, Que. Brockville & Scarborough, Ont. Edmonton & Sentinel, Alta. Vancouver, B.C.	Brockville, Ont.
* Pirelli Cables Ltd.		Cable, multi-conductor Wire, hook up		St. Jean, Que. Guelph, Ont.	St. Jean, Que.
* Powertronic Equipment Ltd.		Power supply assemblies		Scarborough, Ont.	Scarborough, Ont.
* Precision Electronic Components (1971) Ltd.		Resistors, fixed, variable		Toronto, Ont.	Toronto, Ont.
* Quality Communication Products Ltd.		Inductors, iron core		Morden, Man.	Morden, Man.

Company	Computing Equipment Supplied in Canada	Computing Equipment Manufactured in Canada	R & D in Canada	Location of Manufacturing/ R & D Facilities	Location of Canadian Head Office
* Radio Engineering Products Ltd.		Power supply assemblies		Atholville, N.B.	Montreal, Que.
RCA Ltd.		Converters, digital to video		Montreal, Que.	Ste. Anne de Bellevue, Que.
* Renfrew Electric Co. Ltd.		Connectors, for printed circuit board Resistors, all types of fixed, adjustable and variable		Toronto, Ont.	Toronto, Ont.
* Richmond Hill Laboratories		Amplifiers, distribution and main lines Amplifiers, multi taps Amplifiers, video distribution for data display terminals		Scarborough, Ont.	Scarborough, Ont.
Sprague Electric of Canada Ltd.		Capacitors, aluminum, electrolytic Capacitors, tantalum, electrolytic		Toronto, Ont.	Toronto, Ont.
Sperry Univac Computer Systems		Power supply assemblies		Dorval, Que.	Mississauga, Ont.
Stackpole Canada		Resistors, all types of fixed, adjustable and variable		nil	-
* Strite Industries Ltd.		Heat sinks, aluminum		Cambridge, Ont.	Cambridge, Ont.
Texas Instruments Inc.		Transistors, plastic encapsulated		Richmond Hill, Ont.	Richmond Hill, Ont.

Company	Computing Equipment Supplied in Canada	Computing Equipment Manufactured in Canada	R & D in Canada	Location of Manufacturing/ R & D Facilities	Location of Canadian Head Office
TMC (Canada) Ltd.		Cable, harness		Ottawa, Ont.	Ottawa, Ont.
* Weldwyn Canada Ltd.		Resistors, all types fixed, adjustable and variable		London, Ont.	London, Ont.
Westinghouse Canada Ltd.		Display, data Display, graphic Converters, digital to video		Hamilton, Ont. Beamsville, Ont. Burlington, Ont.	Hamilton, Ont.

* Canadian-owned company.

(a) Burrough Business Machines Ltd. scheduled to produce electronic disk cartridge drives in Winnipeg in 1976.
(b) Production has been discontinued.
(c) New product line or plant expansion since 1972/73.
(d) I.P. Sharp Associates developed and produced integrated systems of hardware and software in 1974.

Source: (1) Electronic Industries Association of Canada.
(2) Dept. of Industry, Trade and Commerce.
(3) 1974 Canadian Trade Index.
(4) Data Pro 70, Datapro Research Corporation, Delran, N.J., June 1973.
(5) Canadian Datasystems, Vol. 5, No. 12, McLean Hunter Ltd., Toronto, December 1973.
(6) Tariff Board.

Calculation of Canadian Imports of Computing Equipment

In consultation with Statistics Canada, the Tariff Board identified six commodity classes which could encompass the products and parts of concern to this Reference. These were:

702-90 Electrical and electronic properties measuring and testing instruments, accessories and parts, n.e.s.

703-78 Process-control and multi-function controlling machinery and apparatus.

771-04 Accounting and bookkeeping machines and parts, n.e.s.

771-20 Card punching, sorting and tabulating machines and parts.

771-22 Electronic computers and parts.

634-99 Commercial and industrial telecommunication equipment n.e.s. (excluding parts).

Customs entries for each of these commodity classes for certain selected months from June 1971 to August 1972 were examined, and entries relating to relevant products and parts were recorded. The basis for determining whether or not a particular entry was relevant rested primarily upon the description of the goods on the customs invoice, and also upon the names of the importing and exporting companies, or some combination thereof. No relevant products were found in customs entries classified to commodity class 634-99, and the recorded information relating to this class was subsequently not used.

Two sample months in 1971 were common to the five remaining commodity classes, and these two months were used to represent the base period of the survey. The customs entries recorded for the base period were tabulated by commodity class, and by type of equipment. The totals thus derived enabled the Board to determine the proportions of relevant and non-relevant import values in the import trade statistics published monthly by Statistics Canada by commodity class. The proportions of relevant equipment and parts by commodity class for the base period were as follows: class 702-90, 2.8 per cent; class 703-78, 97.2 per cent; class 771-04, 76.6 per cent; class 771-20, 99.5 per cent; and class 771-22, 95.7 per cent. These proportions were then assessed against the proportions derived from other selected months from June 1971 to August 1972, and were found to be reasonably consistent. It was therefore considered that the proportions of relevant equipment found in each of the commodity classes during the base period could be used with a good degree of confidence to derive the values of computing equipment and parts imports into Canada over longer periods of time. These proportions have been used in Table 7.1 of Chapter VII, which indicates the estimates of relevant import values by commodity class, and by total, from 1966 to 1974.

Where estimates of import values by product group are concerned, the Board employed the proportions indicated by the types of equipment recorded within each of the commodity classes to estimate imports by product group over the 1971-1974 period, as shown in Table 7.2 of Chapter VII. As the total imports by commodity class fluctuate over time, one class relative to another, this causes the imports by product group to fluctuate, and accounts for differences in product group shares of total computing equipment imports from year to year. In the Board's view, the imports by product group over this four-year period are reasonable indications of trends rather than of absolute values.

Appendix E

CLASSIFICATION OF C/C HARDWARE AND SERVICES

Introduction

These two classifications have been developed at Statistics Canada to provide a common framework for the compilation and analysis of data assembled from different sources.

In drafting the classification of automatic data processing hardware, classifications now in use in the Department of Industry, Trade and Commerce, Statistics Canada, Supply and Services Canada and the Tariff Board were studied and compared. The three-digit classes of the standard correspond as closely as possible to classes in the above noted classifications. It is hoped that the two-digit groups of the standard will provide a useful level of aggregation for analysts of data on ADP hardware. For such users the three-digit classes will serve to define the content of the two-digit groups.

The computer services classification will be introduced in the Statistics Canada survey of the computer service industry in 1975[(1)]. It is compatible with the more detailed classification developed and used by Supply and Services Canada.

We are grateful for the generous assistance provided by industry associations and by representatives of other departments of the federal government:

Department of Communications
Department of Industry, Trade and Commerce
Supply and Services Canada
Tariff Board
Treasury Board

(1) Computer Service Industry, 1975, Statistics Canada, Catalogue 63-222.

Standards Division
Statistics Canada
November, 1975.

DRAFT CLASSIFICATION OF AUTOMATIC DATA PROCESSING HARDWARE

1	CENTRAL PROCESSING UNITS AND SINGLE PACKAGE COMPUTERS
11	Digital electronic CPU's and single package computers
12	Analog electronic CPU's and single package computers
19	CPU's and single package computers, n.e.s. (inc. hybrid, fluidic)
2	COMPUTER PERIPHERALS AND AUXILIARY EQUIPMENT, DIGITAL ELECTRONIC(1)
21	Peripheral processing units and control units, digital electronic
211	peripheral processing units (inc. channels)
212	magnetic tape drive control units
213	disk/drum control units
214	transmission and communications control units
215	input-output control units
219	control units, digital electronic, n.e.s.
22	Memory and external storage devices, digital electronic /Key-to-magnetic storage units are classified in 251/
221	memory modules (basic, add-on or replacement; core, chip or other)
224	tape drives
225	disk drives
226	disk packs
227	drums
229	storage devices, digital electronic, n.e.s.
23	Input or output devices capable of giving input to or receiving output from a digital electronic processor
231	punched card input or output devices
232	punched tape input or output devices
233	optical character and code readers, on-line
235	printers, on-line
236	plotters, on line
239	input or output devices, digital electronic, n.e.s. (magnetic card input or output devices; magnetic ink input or output devices; microfilm input or output devices; keyboard, computer; video display output devices and monitors, data telemetry devices)

(1) Some of the equipment classified in Section 2 may also be used with analog and other computer processors.

24	Input-output devices capable of giving input to and receiving output from a digital processor
241	keyboard terminals with video display
242	keyboard terminals, n.e.s.
243	punched card terminals, n.e.s. (inc. card read/punch units)
249	input-output devices, digital electronic, n.e.s. (punched tape read-punch units, optical scanning terminals, MICR terminals)
25	Key-to-magnetic storage and electronic media conversion units
251	key-to-magnetic storage units (magnetic tape reel, cartridge or cassette; disk drum)
252	off-line printers (e.g. magnetic tape to hard copy)
259	media conversion units, digital electronic, n.e.s. (e.g., punched card to magnetic tape, OCR to microfilm)
29	Computer devices and parts, digital electronic, n.e.s. /Communications interface equipment is classified in Section 4./
3	COMPUTER PERIPHERALS AND AUXILIARY EQUIPMENT (EXCEPT DIGITAL ELECTRONIC)(2)
4	COMPUTER-COMMUNICATIONS INTERFACE EQUIPMENT (acoustic couplers, communications line monitors, line adapters, modems)
5	DATA PREPARATION AND HANDLING DEVICES (EX. COMPUTER TYPE)
51	Punched card devices (ex. computer type) (key punches, collators, sorters, summary punches, interpreters, reproducers, etc.)
59	Data preparation and handling devices (ex. computer type), n.e.s. (punched tape devices, ex. computer type, etc.)

(2) This section includes all equipment specifically designed for the processors classified in Groups 12 and 19. None of the equipment in this section can be interconnected with the processors in Group 11.

EXPLANATORY NOTES

The classification has five sections. Section 1 consists of single package computers and central processing units whether digital, analog or hybrid; electronic or fluidic. Section 2 consists of computer peripherals and auxiliary equipment which can be operated under the control of a digital electronic processor. Section 3 also consists of computer peripherals and auxiliary equipment, but the items classified in this section cannot be operated under the control of a digital electronic processor. Section 4 contains equipment used as interface between computers and communications facilities. Section 5 contains automatic data processing equipment of the kind in common use before electronic computers were invented.

Section 1 is subdivided into three groups. The single package computers and central processing units in Group 11 are digital and electronic; those in Group 12 are analog and electronic. Group 19 contains hybrid computers, which are electronic, as well as fluidic computers (and any others) which are not.

All the equipment in Section 2 can be operated under the control of a digital electronic processor. Some of it can be used with other kinds of processors as well (analog, hybrid, fluidic, etc.) This section has been subdivided into six groups according to the primary function of the items to be classified. The primary function of the items is not affected by the configuration of the system in which they are used, and many of these items can be operated either as components of the in-house systems or under the control of remote CPU's to which they are connected through a telecommunications facility.

Group 21 consists of peripheral processing units and separately packaged control units. Peripheral processing units operate under the control of a CPU. Their function is to control routine operations, freeing the CPU for more complex computations and data processing. Control units are not always separately housed. In cases where a control unit and the device it controls form a single physical unit, this unit is classified as a whole according to the function of the device controlled.

Group 22 consists of memory and storage devices. As well as tape drives and disk drives, it includes all kinds of memory modules, core, chip or other, whether basic, add-on or replacement, except those incorporated in and sold as part of central processing units (i.e., not separately priced). It includes also disk packs and drums and other storage devices such as floppy disks. Key-to-magnetic storage units, however, are classified in Group 25. Magnetic tapes, punch cards and punch tape are excluded from this classification since these items are not considered to be hardware.

Group 23 consists of devices capable of either providing input to or accepting output from another digital electronic device, but not capable of doing both. These devices include punched card readers, card punches, punched tape readers, tape punches, document and other optical readers, magnetic ink character readers, microfilm readers and microfilm output devices, on-line printers and plotters, keyboards, display

monitors and others. Devices whose primary function is data capture and storage or data conversion from one storage medium to another are not classified here, but in Group 25, although some of these devices can provide input to external CPU's. Magnetic tape read-write heads are also excluded from this group, since they are usually incorporated in magnetic tape drives which, like disk drives, are classified in Group 22. When purchased separately the read-write heads are classified as parts in Group 29.

Group 24 consists of devices capable of providing input to and accepting output from another digital electronic device, remote or not. As a result, this group contains most of the devices commonly marketed as terminals. "Intelligent" terminals are classified here if they have both input and output capability. Those terminals, however, which have either input or output capability but not both are classified in Group 23.

Group 25 consists of digital electronic units whose primary function is data capture and storage or data conversion from one storage medium to another. Some of these units have the added capability of transmitting the stored data to an external CPU for processing. Such units should be classified here. Units, however, whose primary function is two-way communication with a CPU should be classified in Group 24 whether the units incorporate an intermediate storage component or not.

Group 29 consists of all devices and computer parts not elsewhere classified that are compatible with digital electronic data processing equipment.

Section 3 has not been subdivided. In consists of all computer peripherals, auxiliary equipment and parts that cannot be used in connection with the equipment classified in Group 11, but can be used with that classified in Groups 12 or 19. Most of the equipment classified here is specifically for electronic analog computers. This whole section is of minor importance as compared with Section 2.

No attempt has been made to subdivide Section 4. Possibly a group should be provided for modems.

In Section 5 a group has been provided for punched card devices not operable under the control of a CPU, as well as a residual group for other non-computer automatic data processing devices.

Appendix E (Cont.)

CLASSIFIED LIST OF ADP DEVICES

Code No.	
11	DIGITAL ELECTRONIC CPU'S AND SINGLE PACKAGE COMPUTERS
	Central processing units, electronic, digital Computers, single package, electronic, digital Microcomputers, electronic, digital
12	ANALOG ELECTRONIC CPU'S AND SINGLE PACKAGE COMPUTERS
	Central processing units, electronic, analog Computers navigational, electronic analog Computers, single package, electronic, analog Differential analyzers, electronic, analog
19	CPU'S AND SINGLE PACKAGE COMPUTERS, n.e.s.
	Central processing units, electronic, hybrid Central processing units, fluidic Central processing units, n.e.s. Computers, single package, electronic, hybrid Computers, single package, fluidic Computers, single package, n.e.s. Differential analyzers, digital
211	PERIPHERAL PROCESSING UNITS (inc. channels)
	Communications processors Input/Output channels Input/Output processors Multiplexer channels Peripheral processors Selector channels
212	MAGNETIC TAPE DRIVE CONTROL UNITS
	Cassette drive control units Dual tape controllers Magnetic tape drive control units
213	DISK/DRUM CONTROL UNITS
	Disk/drum control units Disk file control units File control units Storage control units, direct access
214	TRANSMISSION AND COMMUNICATIONS CONTROL UNITS
	Communications controllers Transmission control units

Code No.

215 INPUT-OUTPUT CONTROL UNITS

Card punch control units
Card reader control units
Card read-punch control units
Console display control units
Console printer control units
MICR reader-sorter control units
Microfilm recorder control units
Optical reader control units
Plotter control units
Printer control units
Punched tape punch control units
Punched tape reader control units

219 CONTROL UNITS, n.e.s.

Control units, n.e.s.
Transfer switch control units

221 MEMORY MODULES

Add-on memories
Core memories
Failsoft memory devices
Laser memories
Magnetic core memories
Replacement memories
Semi-conductor memories
Thin film memories
Wire loop memory devices

224 TAPE DRIVES

Cassette drives
Magnetic tape drives

225 DISK DRIVES

Disk drives
Disk storage units

226 DISK PACKS

Cartridge disks
Data modules
Disk packs
Disk files

227 DRUMS

Data cells
Drums

Code No.

229	STORAGE DEVICES, n.e.s.	
	Floppy disks Storage devices, n.e.s.	
231	PUNCHED CARD INPUT OR OUTPUT DEVICES	
	Card punches Card readers Interpreting punches	
232	PUNCHED TAPE INPUT OR OUTPUT DEVICES	
	Punched tape/edge-punched card readers Tape punches	
233	OPTICAL CHARACTER AND CODE READERS, ON-LINE	
	Bar code readers Document readers Mark sensing devices Recognition units, optical Scanners, optical Scanner - sorters, optical Scanner - sorters, optical with MICR Ticket readers, optical	
235	PRINTERS, ON-LINE	
	On-line printers	
236	PLOTTERS, ON-LINE	
	Plotters, on-line	
239	INPUT OR OUTPUT DEVICES, DIGITAL ELECTRONIC, n.e.s.	
	Cathode ray tube phototypesetters, on-line Computer output microfilm (COM) devices Data telemetry devices, digital Display monitors Keyboards Magnetic record readers Teletypewriters, computer type Video displays	
241	KEYBOARD TERMINALS WITH VIDEO DISPLAY	
	Key stations, video display Keyboard display printer units Terminals, keyboard with cathoderay tube Terminals, keyboard with direct display panel	

Code No.	
242	KEYBOARD TERMINALS, n.e.s.
	Automatic send/receive terminal (ex. video) Keyboard-printer terminals (without video) Keyboard send/receive terminal (ex. video)
243	PUNCHED CARD TERMINALS, n.e.s. (inc. card read-punch units)
	Card reader-printers Card reader-printer-punches Card reader-punches Multifunction card units (read, punch, print, sort, collate)
249	INPUT-OUTPUT DEVICES, DIGITAL ELECTRONIC, n.e.s.
	MICR terminals Optical scanning terminals Punched tape reader-printers
251	KEY-TO-MAGNETIC STORAGE UNITS
	Key-to-cartridge data inscribers Key-to-cassette data inscribers Key-to-disk storage units Key-to-magnetic tape storage units Magnetic data central pooler (keyboard, display/control cable connected to freestanding tape transport) Magnetic data recorders (keyboard, display/control panel + tape transport all in one cabinet)
252	PRINTERS OFF-LINE
	Magnetic tape-to-printer units Optical character or code-to-printer units Printers, off-line, n.e.s.
259	MEDIA CONVERSION UNITS, DIGITAL ELECTRONIC, n.e.s.
	Cassette-to-magnetic tape reel conversion units Magnetic tape-to-disk/drum conversion units Microfilm-to-magnetic tape conversion units Optical character or code-to-magnetic tape conversion units Plotters, off-line Punched card-to-magnetic tape conversion units Punched tape-to-magnetic tape conversion units

Code No.	
29	COMPUTER DEVICE AND PARTS, DIGITAL ELECTRONIC, n.e.s.
	Consoles Display adapters Exchanges (electronic switching devices, Burroughs) Interface devices, n.e.s. Magnetic tape read-write heads Memory control cabinets Power supplies Synchronous clocks
3	COMPUTER PERIPHERALS AND AUXILIARY EQUIPMENT (EXCEPT DIGITAL ELECTRONIC)
	Computer parts, electronic, analog Computer parts, n.e.s., not compatible with digital electronic CPU's Digitizers Peripheral devices and auxiliary equipment, analog Peripheral devices and auxiliary equipment, n.e.s., not compatible with digital electronic CPU's Quantizers
4	COMPUTER-COMMUNICATIONS INTERFACE EQUIPMENT, COMPUTER
	Acoustic adapters Acoustic data couplers Communications line monitors Communications scanners Concentrators Converters, analog-digital and digital-analog Data set adapters Error detection and correction devices Line adapters Line interface bases Line sets Modems
51	PUNCHED CARD DEVICES (EX. COMPUTER TYPE)
	Collators Data recorders (buffered) (punch, verify) Data recorders (non-buffered) Inscribers Interpreters Keypunches Parts for punched card devices (ex. computer type) Portable punches Punched card devices (ex. computer type) n.e.s. Reproducers Sorters Summary punches Verifiers Verifying interpreting punches

Code No.	
59	DATA PREPARATION AND HANDLING DEVICES (EX. COMPUTER TYPE), n.e.s.
	Punched tape punches (ex. computer type) Punched tape readers (ex. computer type) Punched tape verifiers (ex. computer type)

Source: Statistics Canada, Standards Division, Report No. 14 for the Classification of Automatic Data Processing Hardware and Computer Services, November 1975.

Appendix F
Appendice F

Imports: Electrical and electronic properties measuring and testing instruments, accessories and parts n.e.s. c.c. 702-90[(a)]
Importations: Instruments à mesurer et à essayer les quantités et les propriétés électriques et électroniques n.d.a. c.m. 702-90[a)]

Tariff Items) 44524-1, 44532-1 and 69605-1
Numéros tarifaires) 44524-1, 44532-1 et 69605-1

Year / Année	Total imports / Importations totales $'000 milliers de $	Dutiable value / Valeur imposable $'000 milliers de $	Duty collected / Droits perçus $'000 milliers de $	Duty as % of dutiable value / Droits en % de la valeur imposable
		Total - Total		
1968	18,955	12,074	1,420	11.8
1969	20,335	13,533	1,555	11.5
1970	19,527	13,439	1,464	10.9
1971	17,322	11,984	1,358	11.3
1972	18,417	13,144	1,515	11.5
1973	21,275	15,432	1,685	10.9
1974	26,620	20,423	2,187	10.7
	Total British Preferential - Total, préférence britannique			
1968	2,033	216	30	13.9
1969	2,564	187	27	14.4
1970	1,707	277	38	13.7
1971	1,561	225	30	13.3
1972	1,852	207	30	14.5
1973	1,895	298	34	11.4
1974	2,389	576	59	10.2
	Total Most-Favoured-Nation - Total, nation la plus favorisée			
1968	16,922	11,858	1,390	11.7
1969	17,771	13,346	1,528	11.4
1970	17,819	13,162	1,427	10.8
1971	15,762	11,760	1,328	11.3
1972	16,565	12,937	1,484	11.5
1973	19,380	15,134	1,653	10.9
1974	24,231	19,848	2,128	10.7
	United Kingdom - Royaume-Uni			
1968	2,033	216	30	13.8
1969	2,488	182	26	14.3
1970	1,688	269	37	13.8
1971	1,535	208	27	13.0
1972	1,836	203	30	14.8
1973	1,887	297	34	11.4
1974	2,387	574	59	10.3

Appendix F (Cont.)
Appendice F (Suite)

Year / Année	Total imports / Importations totales $'000 milliers de $	Dutiable value / Valeur imposable $'000 milliers de $	Duty collected / Droits perçus $'000 milliers de $	Duty as % of dutiable value / Droits en % de la valeur imposable
		Australia - Australie		
1968	-	-	-	-
1969	59	5	1	20.0
1970	12	6	1	16.7
1971	22	14	2	14.3
1972	10	4	*	13.7
1973	8	1	*	15.0
1974	2	2	*	11.5
		France - France		
1968	32	28	5	17.9
1969	51	32	4	12.5
1970	58	22	2	9.1
1971	30	21	2	9.5
1972	13	8	1	12.5
1973	18	14	2	14.3
1974	60	58	10	17.2
		Germany West - Allemagne de l'Ouest		
1968	608	545	46	8.5
1969	854	822	73	8.9
1970	670	658	58	8.8
1971	827	674	59	8.7
1972	886	858	71	8.2
1973	1,138	850	71	8.4
1974	720	690	64	9.3
		Italy - Italie		
1968	112	110	8	7.3
1969	55	55	5	9.1
1970	14	14	1	7.1
1971	14	9	1	11.1
1972	9	9	1	11.1
1973	12	12	2	16.7
1974	3	3	1	33.3

Appendix F (Cont.)
Appendice F (Suite)

Year Année	Total imports Importations totales $'000 milliers de $	Dutiable value Valeur imposable $'000 milliers de $	Duty collected Droits perçus $'000 milliers de $	Duty as % of dutiable value Droits en % de la valeur imposable
	The Netherlands - Pays-Bas			
1968	158	154	13	8.4
1969	193	193	17	8.7
1970	220	218	19	8.8
1971	352	352	46	13.1
1972	96	95	10	10.5
1973	45	45	5	11.1
1974	136	132	15	11.2
	Belgium and Luxembourg - Belgique et Luxembourg			
1968-70	-	-	-	-
1971	*	*	*	17.2
1972	-	-	-	-
1973	4	4	1	25,0
1974	3	3	*	10.9
	Sweden - Suède			
1968	14	14	2	14.9
1969	30	27	2	7.4
1970	41	35	5	14.3
1971	153	44	6	13.6
1972	64	64	8	12.4
1973	69	69	6	8.9
1974	35	35	3	8.6
	Japan - Japon			
1968	130	120	20	16.7
1969	176	167	24	14.3
1970	126	120	16	13.3
1971	112	88	13	14.7
1972	167	152	23	15.1
1973	289	277	39	14.1
1974	319	288	39	13.5
	United States of America - Etats-Unis d'Amérique			
1968	15,566	10,668	1,270	11.9
1969	16,013	11,743	1,367	11.6
1970	16,324	11,839	1,298	11.0
1971	13,835	10,451	1,189	11.4
1972	14,900	11,590	1,351	11.7
1973	17,158	13,552	1,493	11.0
1974	22,197	18,319	1,967	10.7

Appendix F (Concl.)
Appendice F (Fin)

Year Année	Total imports Importations totales $'000 milliers de $	Dutiable value Valeur imposable $'000 milliers de $	Duty collected Droits perçus $'000 milliers de $	Duty as % of dutiable value Droits en % de la valeur imposable
	Other Countries - Autres Pays			
1968	302	220	25	11.4
1969	416	307	34	11.2
1970	373	257	28	10.9
1971	441	120	13	10.8
1972	436	162	20	12.3
1973	648	312	31	9.8
1974	758	319	29	9.1

(a) Prior to 1968 included in c.c. 709-27 "Electricity measuring instruments". In 1971 excludes class 702-41 "Signal generators and test oscillators".

a) Jusqu'en 1968 compris dans c.m. 709-27 "Instruments de mesure de l'électricité". En 1971 exclus la classe 702-41 "Générateurs étalonnés et hétérodlynes de service".

Source: Statistics Canada.
Statistique Canada.

Appendix G
Appendice G

Imports: Process control and multi-function controlling machinery and apparatus, c.c. 703-78[(a)]
Importations: Machines et appareils à fonctions multiples pour controle des opérations, c.m. 703-78[a)]

Tariff Items))44524-1, 44532-1, 46200-1 and 69605-1
Numéros tarifaires) et

Year / Année	Total imports / Importations totales $'000 milliers de $	Dutiable value / Valeur imposable $'000 milliers de $	Duty collected / Droits perçus $'000 milliers de $	Duty as % of dutiable value / Droits en % de la valeur imposable
		Total - Total		
1969	1,785	990	132	13.3
1970	3,164	2,317	294	12.7
1971	3,599	2,651	347	13.1
1972	3,692	3,116	406	13.0
1973	4,941	4,003	506	12.6
1974	6,442	4,816	655	13.6
		Total British Preferential - Total, préférence britannique		
1969	318	164	23	14.0
1970	525	441	53	12.0
1971	184	133	19	14.3
1972	100	72	4	5.6
1973	273	266	38	14.3
1974	185	129	12	9.3
		Total Most-Favoured-Nation - Total, nation la plus favorisée		
1969	1,467	826	110	13.3
1970	2,639	1,876	241	12.8
1971	3,415	2,518	328	13.0
1972	3,592	3,044	403	13.2
1973	4,668	3,738	468	12.5
1974	6,257	4,687	643	13.7

Appendix G (Cont.)
Appendice G (Suite)

Year / Année	Total imports / importations totales $'000 milliers de $	Dutiable value / Valeur imposable $'000 milliers de $	Duty collected / Droits perçus $'000 milliers de $	Duty as % of dutiable value / Droits en % de la valeur imposable
		United Kingdom - Royaume-Uni		
1969	318	164	23	14.0
1970	525	441	53	12.1
1971	184	133	19	14.3
1972	100	72	4	5.6
1973	268	260	37	14.2
1974	92	61	7	11.5
		Germany West - Allemagne de l'Ouest		
1969	33	-	-	-
1970	18	17	3	17.6
1971	69	69	10	14.4
1972	1	1	*	7.5
1973	33	33	6	18.2
1974	32	32	3	9.4
		Italy - Italie		
1969	3	3	*	17.5
1970	-	-	-	-
1971	194	-	-	-
1972	15	15	3	20.0
1973	1	-	-	-
1974	-	-	-	-
		France - France		
1969-71	-	-	-	-
1972	51	51	8	15.7
1973	5	-	-	-
1974	5	5	1	20.0
		Sweden - Suède		
1969	-	-	-	-
1970	46	46	7	15.2
1971	11	2	*	17.5
1972	26	26	3	11.5
1973	-	-	-	-
1974	2	2	*	7.5

Appendix G (Concl.)
Appendice G (Fin)

Year Année	Total imports importations totales $'000 milliers de $	Dutiable value Valeur imposable $'000 milliers de $	Duty collected Droits perçus $'000 milliers de $	Duty as % of dutiable value Droits en % de la valeur imposable
		Japan - Japon		
1969	-	-	-	-
1970	1	1	*	17.5
1971	-	-	-	-
1972	2	2	*	15.0
1973	*	*	*	17.4
1974	-	-	-	-
		United States of America - Etats-Unis d'Amérique		
1969	1,431	823	109	13.2
1970	2,561	1,799	228	12.7
1971	3,030	2,337	309	13.2
1972	3,290	2,762	371	13.4
1973	4,626	3,702	462	12.5
1974	6,211	4,641	638	13.7
		Other Countries - Autres Pays		
1969	-	-	-	-
1970	13	13	3	23.1
1971	111	110	9	8.2
1972	207	187	17	9.1
1973	8	8	1	12.5
1974	100	75	6	8.0

(a) Prior to 1969 included in c.c. 703-90 "Measuring and measuring-controlling instruments n.e.s."
Prior to 1972 class description "Combination measuring instruments and multiple function controlling machinery and apparatus."

a) Antérieurement à 1969 compris dans la c.m. 703-90 "Instruments de mesure et instruments mesureurs-régulateurs n.d.a."
Antérieurement à 1972, description de la c.m. était "Instruments combinés mesure et fonction multiple."

Source: Statistics Canada.
Statistique Canada.

Appendix H
Appendice H

Imports: Accounting and bookkeeping machines and parts n.e.s. c.c. 771-04[(a)]
Importations: Machines comptables et leurs pièces, n.d.a. c.m. 771-04[a)]

Tariff Items) 41415-1 and 42700-1
Numéros tarifaires) et

Year / Année	Total imports / Importations totales $'000 milliers de $	Dutiable value / Valeur imposable $'000 milliers de $	Duty collected / Droits perçus $'000 milliers de $	Duty as % of dutiable value / Droits en % de la valeur imposable
		Total - Total		
1964	13,717	13,674	1,366	10.0
1965	11,095	11,052	1,117	10.1
1966	12,927	12,227	1,231	10.1
1967	15,261	13,356	1,330	10.0
1968	15,091	12,996	1,313	10.1
1969	17,565	14,279	1,457	10.2
1970	16,388	11,857	1,231	10.4
1971	21,801	19,315	2,012	10.4
1972	28,937	22,140	2,235	10.1
1973	23,418	15,222	1,553	10.2
1974	28,727	24,185	2,478	10.2
		Total British Preferential - Total, préférence britannique		
1964	88	62	6	10.0
1965	4	*	*	9.8
1966	739	111	11	10.0
1967	1,986	151	14	9.3
1968	1,398	30	3	10.0
1969	2,464	21	2	9.5
1970	2,249	68	6	8.8
1971	1,530	28	2	7.1
1972	4,322	79	7	8.9
1973	3,791	41	4	9.8
1974	2,037	29	3	10.3

Appendix H (Cont.)
Appendice H (Suite)

Year / Année	Total imports / Importations totales $'000 milliers de $	Dutiable value / Valeur imposable $'000 milliers de $	Duty collected / Droits perçus $'000 milliers de $	Duty as % of dutiable value / Droits en % de la valeur imposable
Total Most-Favoured-Nation - Total, nation la plus favorisée				
1964	13,628	13,612	1,359	10.0
1965	11,091	11,052	1,117	10.1
1966	12,188	12,116	1,220	10.1
1967	13,275	13,205	1,316	10.0
1968	13,693	12,965	1,309	10.1
1969	15,100	14,258	1,455	10.2
1970	14,139	11,789	1,224	10.4
1971	20,271	19,287	2,010	10.4
1972	24,614	22,061	2,228	10.1
1973	19,627	15,181	1,549	10.2
1974	26,689	24,156	2,476	10.2
United Kingdom - Royaume-Uni				
1964	88	62	6	9.7
1965	4	*	*	9.8
1966	739	111	11	9.9
1967	1,986	151	14	9.3
1968	1,398	30	3	10.0
1969	2,464	21	2	9.5
1970	2,249	68	6	8.8
1971	1,530	28	2	7.1
1972	4,322	79	7	8.7
1973	3,789	39	3	7.7
1974	2,030	28	2	7.1
West Germany - Allemagne de l'Ouest				
1964	175	175	17	9.7
1965	49	49	7	14.3
1966	74	74	8	10.8
1967	4	4	*	9.7
1968	17	17	2	11.8
1969	28	28	3	10.7
1970	468	468	47	10.0
1971	771	771	78	10.1
1972	902	902	93	10.3
1973	1,697	1,686	171	10.1
1974	2,627	2,627	263	10.0

Appendix H (Cont.)
Appendice H (Suite)

Year Année	Total imports Importations totales $'000 milliers de $	Dutiable value Valeur imposable $'000 milliers de $	Duty collected Droits perçus $'000 milliers de $	Duty as % of dutiable value Droits en % de la valeur imposable
		Italy - Italie		
1964	686	677	68	10.0
1965	791	754	76	10.1
1966	679	635	63	10.0
1967	1,132	1,086	109	10.0
1968	640	628	63	10.0
1969	345	343	34	9.9
1970	582	542	55	10.1
1971	1,024	973	98	10.1
1972	1,036	926	97	10.5
1973	640	629	64	10.1
1974	322	274	29	10.6
		The Netherlands - Pays-Bas		
1964	117	113	11	9.7
1965	152	152	16	10.5
1966	459	451	48	10.6
1967	532	532	51	9.6
1968	413	410	41	10.0
1969	432	429	43	10.0
1970	277	273	27	9.9
1971	478	416	42	10.1
1972	441	351	35	10.0
1973	530	477	48	10.0
1974	254	246	24	9.8
		Belgium and Luxembourg - Belgique et Luxembourg		
1964	-	-	-	-
1965	12	12	1	8.3
1966	6	6	1	16.7
1967	-	-	-	-
1968	-	-	-	-
1969	-	-	-	-
1970	1	1	*	9.9
1971	2	2	*	10.0
1972	523	261	26	10.0
1973	84	76	8	10.5
1974	128	126	14	11.1

Appendix H (Cont.)
Appendice H (Suite)

Year Année	Total imports Importations totales $'000 milliers de $	Dutiable value Valeur imposable $'000 milliers de $	Duty collected Droits perçus $'000 milliers de $	Duty as % of dutiable value Droits en % de la valeur imposable
		France - France		
1964-67	-	-	-	-
1968	30	30	3	10.1
1969-71	-	-	-	-
1972	*	*	*	10.0
1973	2	2	*	9.9
1974	407	407	41	10.1
		Sweden - Suède		
1964	112	112	11	9.8
1965	56	56	6	10.7
1966	69	69	7	10.1
1967	49	34	6	17.6
1968	104	104	11	10.6
1969	40	40	4	10.0
1970	289	135	14	10.4
1971	161	99	11	11.1
1972	74	74	8	10.8
1973	108	107	11	10.3
1974	72	59	6	10.2
		Japan - Japon		
1964-68	-	-	-	-
1969	79	79	8	10.1
1970	12	12	1	8.3
1971	107	107	11	10.3
1972	114	114	11	9.6
1973	69	67	7	10.4
1974	197	196	20	10.2

Appendix H (Concl.)
Appendice H (Fin)

Year Année	Total imports Importations totales $'000 milliers de $	Dutiable value Valeur imposable $'000 milliers de $	Duty collected Droits perçus $'000 milliers de $	Duty as % of dutiable value Droits en % de la valeur imposable
	United States of America - Etats-Unis d'Amérique			
1964	12,538	12,535	1,252	10.0
1965	10,031	10,028	1,011	9.8
1966	10,879	10,859	1,091	10.0
1967	11,557	11,549	1,150	10.0
1968	12,489	11,775	1,189	10.1
1969	14,176	13,338	1,361	10.2
1970	12,509	10,357	1,080	10.4
1971	17,716	16,915	1,770	10.5
1972	21,428	19,378	1,945	10.0
1973	16,491	12,137	1,241	10.2
1974	22,681	20,219	2,078	10.3
	Other Countries - Autres Pays			
1964	1	1	*	10.0
1965	-	-	-	-
1966	22	22	2	10.0
1967	-	-	-	-
1968	1	1	*	25.0
1969	-	-	-	-
1970	2	2	*	15.0
1971	12	5	*	10.1
1972	96	54	11	20.4
1973	7	3	*	13.6
1974	8	2	*	12.4

(a) Prior to 1964 included in c.c. 5501 "Bookkeeping calculating and invoicing machines and parts n.o.p."
a) Antérieurement à 1964 compris dans la c.m. 5501 "Machines à comptabilité à calculer et facturer et toutes leurs pièces n.d.a."

Source: Statistics Canada.
Statistique Canada.

Appendix I
Appendice I

Imports: Card punching, sorting and tabulating machines and parts, c.c. 771-20[a]
Importations: Perforatrices, trieuses, tabulatrices et pièces, c.m. 771-20[a]

Tariff Items / Numéros tarifaires: 41415-1, 42700-1 and / et 44524-1

Year / Année	Total imports / Importations totales $'000 milliers de $	Dutiable value / Valeur imposable $'000 milliers de $	Duty collected / Droits perçus $'000 milliers de $	Duty as % of dutiable value / Droits en % de la valeur imposable
		Total - Total		
1964	11,896	11,673	1,013	8.7
1965	5,968	5,856	494	8.4
1966	11,625	11,174	889	8.0
1967	10,550	6,222	499	8.0
1968	12,396	6,623	670	10.1
1969	17,365	13,578	1,846	13.6
1970	41,530	30,867	4,398	14.2
1971	85,970	54,393	7,956	14.6
1972	108,593	51,404	7,452	14.5
1973	60,034	48,970	6,331	12.9
1974	73,830	32,806	3,975	12.1
		Total British Preferential - Total, préférence britannique		
1964	87	30	2	6.6
1965	84	3	*	14.1
1966	450	12	1	8.3
1967	4,534	219	17	7.8
1968	5,065	876	24	2.7
1969	1,879	1,222	30	2.5
1970	1,549	1,407	40	2.8
1971	2,662	1,082	45	4.2
1972	2,660	2,048	82	4.0
1973	8,279	7,990	200	2.5
1974	9,968	7,328	188	2.6

Appendix I (Cont.)
Appendice I (Suite)

Year / Année	Total imports / Importations totales $'000 milliers de $	Dutiable value / Valeur imposable $'000 milliers de $	Duty collected / Droits perçus $'000 milliers de $	Duty as % of dutiable value / Droits en % de la valeur imposable
	Total Most Favoured Nation - Total, nation la plus favorisée			
1964	11,809	11,643	1,011	8.7
1965	5,884	5,853	494	8.4
1966	11,175	11,162	888	8.0
1967	6,016	6,003	482	8.0
1968	7,331	5,748	646	11.2
1969	15,486	12,356	1,816	14.7
1970	39,982	29,460	4,357	14.8
1971	83,308	53,312	7,911	14.8
1972	105,933	49,356	7,370	14.9
1973	51,755	40,980	6,131	15.0
1974	63,862	25,478	3,787	14.9
	United Kingdom - Royaume-Uni			
1964	87	30	2	6.6
1965	84	3	*	14.1
1966	450	12	1	8.3
1967	4,322	8	1	12.5
1968	5,036	853	21	2.5
1969	1,879	1,222	30	2.5
1970	1,549	1,407	40	2.9
1971	2,662	1,082	45	4.2
1972	2,660	2,048	82	4.0
1973	8,279	7,990	200	2.5
1974	9,967	7,327	188	2.6
	Belgium and Luxembourg - Belgique et Luxembourg			
1964-71	-	-	-	-
1972	*	*	*	14.8
1973	15	-	-	-
1974	19	15	2	13.3

Appendix I (Cont.)
Appendice I (Suite)

Year / Année	Total imports / Importations totales $'000 milliers de $	Dutiable value / Valeur imposable $'000 milliers de $	Duty collected / Droits perçus $'000 milliers de $	Duty as % of dutiable value / Droits en % de la valeur imposable
		France - France		
1964	85	85	6	7.1
1965	326	326	32	9.8
1966	110	110	16	14.5
1967	44	44	5	11.4
1968	313	313	37	11.7
1969	104	104	11	10.6
1970	41	41	6	14.6
1971	954	865	129	14.9
1972	649	168	23	13.6
1973	7,327	7,015	1,052	15.0
1974	8,825	3,738	558	14.9
		Germany West - Allemagne de l'Ouest		
1964	40	40	4	10.0
1965	62	62	5	8.1
1966	51	51	5	9.8
1967	112	112	11	9.8
1968	201	201	23	11.4
1969	119	103	15	14.6
1970	29	12	2	16.7
1971	35	29	4	13.8
1972	25	14	2	14.9
1973	1,078	1,011	151	15.0
1974	3,973	2,199	329	15.0
		Italy - Italie		
1964	175	175	14	8.0
1965	54	54	4	7.4
1966	61	61	5	8.2
1967	46	46	3	6.5
1968	53	42	6	14.3
1969	7	6	1	16.7
1970	10	10	2	20.0
1971	4	4	1	25.0
1972	5	2	*	15.0
1973	87	86	13	15.1
1974	189	182	27	14.8

Appendix I (Cont.)
Appendice I (Suite)

Year Année	Total imports Importations totales $'000 milliers de $	Dutiable value Valeur imposable $'000 milliers de $	Duty collected Droits perçus $'000 milliers de $	Duty as % of dutiable value Droits en % de la valeur imposable
		The Netherlands - Pays-Bas		
1964	31	31	2	6.5
1965	126	126	9	7.1
1966	1	1	*	10.0
1967	1	1	*	10.0
1968	5	2	*	10.0
1969	*	*	*	14.7
1970	4	4	1	25.0
1971	4	4	1	25.0
1972	9	1	*	17.5
1973	*	*	*	15.0
1974	82	59	9	15.2
		Sweden - Suède		
1964	-	-	-	-
1965	5	5	*	8.2
1966	68	68	5	7.4
1967	235	235	18	7.7
1968	88	20	1	5.0
1969	19	12	*	0.7
1970	23	1	*	14.9
1971	-	-	-	-
1972	26	26	4	15.4
1973	38	31	5	16.1
1974	168	123	18	14.6
		Japan - Japon		
1964	22	22	2	9.1
1965	308	308	23	7.5
1966	5,807	5,807	435	7.5
1967	2,092	2,092	157	7.5
1968	187	187	26	13.9
1969	18	18	3	16.6
1970	410	410	61	14.8
1971	416	191	29	15.2
1972	1,487	956	143	15.0
1973	1,584	1,388	208	15.0
1974	2,233	1,246	186	15.0

Appendix I (Concl.)
Appendice I (Fin)

Year Année	Total imports Importations totales $'000 milliers de $	Dutiable value Valeur imposable $'000 milliers de $	Duty collected Droits perçus $'000 milliers de $	Duty as % of dutiable value Droits en % de la valeur imposable
	United States of America - Etats-Unis d'Amérique			
1964	11,456	11,290	983	8.7
1965	4,949	4,918	415	8.4
1966	4,769	4,757	396	8.3
1967	3,256	3,242	270	8.3
1968	6,126	4,815	535	11.1
1969	15.011	11,978	1,771	14.8
1970	39,047	28,783	4,262	14.8
1971	80,788	51,502	7,641	14.8
1972	101,826	46,358	6,923	14.9
1973	39,727	29,590	4,424	15.0
1974	45,270	17,251	2,558	14.8
	Others - Autres			
1964	-	-	-	-
1965	55	55	4	7.3
1966	307	307	26	8.5
1967	442	442	33	7.5
1968	386	190	21	11.1
1969	208	134	15	11.2
1970	418	199	25	12.6
1971	1,107	717	107	15.0
1972	1,906	1,830	274	15.0
1973	1,899	1,859	278	15.0
1974	3,106	665	99	14.9

(a) Prior to 1964 included in various commodity classes.
a) Antérieurement à 1964 était compris dans plusieurs classes.

Source: Statistics Canada.
Source: Statistique Canada.

Appendix J
Appendice J

Imports: Electronic computers and parts, c.c. 771-22[(a)]
Importations: Ordinateurs electroniques et pièces, c.m. 771-22[a)]

Tariff Items) and
) 41220-1, 41405-1, 41415-1, 42700-1, 44524-1 69605-1
Numéros tarifaires) et

Year / Année	Total imports / Importations totales $'000 milliers de $	Dutiable value / Valeur imposable $'000 milliers de $	Duty collected / Droits perçus $'000 milliers de $	Duty as % of dutiable value / Droits en % de la valeur imposable
		Total - Total		
1960	3,149	2,489	348	14.0
1961	8,505	8,095	1,346	16.6
1962	13,559	11,375	2,065	18.2
1963	16,359	13,621	2,035	14.9
1964	30,311	27,256	3,386	12.4
1965	50,510	47,399	5,940	12.5
1966	93,495	88,355	10,085	11.4
1967	115,902	103,782	11,472	11.1
1968	108,606	85,019	10,544	12.4
1969	160,527	118,860	14,653	12.3
1970	176,290	124,456	15,099	12.1
1971	184,161	124,306	15,317	12.3
1972	212,418	143,891	18,189	12.6
1973	276,813	199,385	25,091	12.6
1974	333,115	226,693	28,382	12.5
	Total British Preferential - Total, préférence britannique			
1960	242	1	*	15.0
1961	13	2	*	14.8
1962	11	10	2	20.0
1963	120	12	2	16.7
1964	21	1	*	14.9
1965	356	157	19	12.2
1966	2,187	317	28	8.8
1967	4,043	302	25	8.3
1968	3,690	999	109	10.9
1969	4,204	1,530	147	9.6
1970	6,767	3,354	226	6.7
1971	4,594	2,265	140	6.2
1972	2,987	1,234	103	8.4
1973	5,325	1,447	55	3.8
1974	5,575	1,973	167	8.5

Appendix J (Cont.)
Appendice J (Suite)

Year / Année	Total imports / Importations totales $'000 milliers de $	Dutiable value / Valeur imposable $'000 milliers de $	Duty collected / Droits perçus $'000 milliers de $	Duty as % of dutiable value / Droits en % de la valeur imposable
Total Most-Favoured-Nation - Total, nation la plus favorisée				
1960	2,907	2,487	348	14.0
1961	8,492	8,093	1,346	16.6
1962	13,549	11,365	2,063	18.2
1963	16,239	13,609	2,033	14.9
1964	30,290	27,255	3,386	12.4
1965	50,154	47,242	5,921	12.5
1966	91,308	88,038	10,057	11.4
1967	111,859	103,480	11,448	11.1
1968	104,916	84,020	10,435	12.4
1969	156,323	117,330	14,506	12.4
1970	169,523	121,102	14,872	12.3
1971	179,567	122,041	15,177	12.4
1972	209,432	142,657	18,086	12.7
1973	271,487	197,937	25,036	12.6
1974	327,540	224,720	28,215	12.6
United Kingdom - Royaume-Uni				
1960	242	1	*	15.0
1961	13	2	*	14.8
1962	11	10	2	20.0
1963	120	12	2	16.7
1964	21	1	*	14.9
1965	354	155	19	12.3
1966	2,187	317	28	8.8
1967	4,043	302	25	8.2
1968	3,690	999	109	10.9
1969	4,143	1,469	141	9.6
1970	6,534	3,121	203	6.5
1971	4,476	2,160	130	6.0
1972	2,430	1,058	85	8.0
1973	4,261	1,409	51	3.6
1974	5,018	1,969	166	8.4
Belgium and Luxembourg - Belgique et Luxembourg				
1960-69	-	-	-	-
1970	20	20	2	10.0
1971	169	169	18	10.6
1972	1,031	822	88	10.7
1973	1,119	660	73	11.1
1974	941	769	97	12.6

Appendix J (Cont.)
Appendice J (Suite)

Year / Année	Total imports / Importations totales $'000 milliers de $	Dutiable value / Valeur imposable $'000 milliers de $	Duty collected / Droits perçus $'000 milliers de $	Duty as % of dutiable value / Droits en % de la valeur imposable
		France - France		
1960-61	-	-	-	-
1962	62	62	17	27.4
1963	261	261	31	11.9
1964	134	134	13	9.7
1965	3,668	3,668	587	16.0
1966	5,730	5,730	804	14.0
1967	6,881	6,881	634	9.2
1968	2,405	2,405	283	11.8
1969	513	301	39	13.0
1970	161	159	19	11.9
1971	8,773	8,346	842	10.1
1972	3,080	2,265	259	11.4
1973	1,953	1,663	229	13.8
1974	2,578	2,079	259	12.4
		Italy - Italie		
1960-64	-	-	-	-
1965	5	5	*	10.1
1966	393	324	30	9.3
1967	967	781	104	13.3
1968	705	639	86	13.4
1969	91	33	4	12.1
1970	247	65	7	10.8
1971	1,073	330	46	13.9
1972	253	143	21	14.7
1973	1,214	1,041	133	12.8
1974	950	868	107	12.3
		Germany West - Allemagne de l'Ouest		
1960	-	-	-	-
1961	27	27	3	11.1
1962	34	34	8	23.5
1963	12	12	3	25.0
1964	96	96	15	15.6
1965	345	345	51	14.8
1966	875	875	88	10.1
1967	1,421	1,418	132	9.3
1968	1,465	1,000	122	12.2
1969	2,463	1,922	206	10.7
1970	2,744	2,004	212	10.6
1971	442	309	37	12.0
1972	663	412	48	11.6
1973	701	481	60	12.5
1974	1,688	1,394	167	12.0

Appendix J (Cont.)
Appendice J (Suite)

Year / Année	Total imports / Importations totales $'000 milliers de $	Dutiable value / Valeur imposable $'000 milliers de $	Duty collected / Droits perçus $'000 milliers de $	Duty as % of dutiable value / Droits en % de la valeur imposable
		The Netherlands - Pays-Bas		
1960-61	-	-	-	-
1962	104	104	16	15.4
1963	57	57	8	14.0
1964	12	12	1	8.3
1965	157	157	17	10.8
1966	682	681	73	10.7
1967	1,042	1,042	111	10.7
1968	1,432	1,217	156	12.8
1969	1,869	1,279	177	13.9
1970	1,196	1,050	147	14.0
1971	1,112	618	88	14.2
1972	1,709	709	91	12.8
1973	578	413	44	10.7
1974	550	496	54	10.9
		Sweden - Suède		
1060-65	-	-	-	-
1966	51	51	5	9.8
1967	84	79	8	10.1
1968	259	241	26	10.8
1969	103	79	9	11.4
1970	92	59	6	10.2
1971	200	189	21	11.1
1972	660	637	64	10.0
1973	608	548	79	14.4
1974	302	193	29	15.0
		Japan - Japon		
1960-64	-	-	-	-
1965	1,302	1,302	126	9.7
1966	407	397	39	9.8
1967	233	218	21	9.6
1968	68	39	5	12.8
1969	57	36	5	13.9
1970	1,170	1,084	136	12.5
1971	6,743	5,213	539	10.3
1972	5,245	4,598	483	10.5
1973	2,679	2,046	243	11.9
1974	2,279	1,824	201	11.0

Appendix J (Concl.)
Appendice J (Fin)

Year Année	Total imports Importations totales $'000 milliers de $	Dutiable value Valeur imposable $'000 milliers de $	Duty collected Droits perçus $'000 milliers de $	Duty as % of dutiable value Droits en % de la valeur imposable
	United States of America - Etats-Unis d'Amérique			
1960	2,907	2,487	348	14.0
1961	8,464	8,066	1,343	16.7
1962	13,349	11,165	2,023	18.1
1963	15,889	13,259	1,990	15.0
1964	30,048	27,012	3,357	12.4
1965	44,609	41,725	5,136	12.3
1966	83,126	79,964	9,018	11.3
1967	101,223	93,052	10,438	11.2
1968	98,497	78,444	9,753	12.4
1969	151,155	113,640	14,062	12.4
1970	163,874	116,644	14,340	12.3
1971	160,502	106,440	13,533	12.7
1972	196,228	132,630	16,979	12.8
1973	261,986	190,589	24,113	12.7
1974	317,118	216,180	27,181	12.6
	Others - Autres			
1960-62	-	-	-	-
1963	20	20	2	10.0
1964	-	-	-	-
1965	71	43	3	7.0
1966	44	16	1	6.3
1967	8	8	1	12.5
1968	85	35	4	11.4
1969	134	102	11	10.7
1970	267	251	26	10.3
1971	671	532	80	15.0
1972	1,119	617	72	11.7
1973	1,714	535	66	12.3
1974	1,692	921	121	13.1

(a) Prior to 1964 was c.c. 5510 and included magnetic tape; prior to 1960 included in various commodity classes.
a) Antérieurement à 1964 était c.m. 5510 et comprenait ruban magnétique; antérieurement à 1960 était compris dans plusieurs classes.

Source: Statistics Canada.
Source: Statistique Canada.

Exports and Re-Exports: Card punching, sorting and tabulating machines, electronic computers, and parts, c.c. 771-21[(a)]

Exportations et réexportations: Perforatrices, trieuses et tabulatrices, calculateurs electroniques et leurs pièces, c.m. 771-21[a)]

Year Année	Exports Exportations $'000	Re-Exports Réexportations $'000	Total Total $'000
	Total - Total		
1961	21,078	871	21,949
1962	27,553	1,171	28,724
1963	25,179	800	25,979
1964	32,199	1,593	33,792
1965	27,091	2,025	29,116
1966	32,932	3,518	36,450
1967	44,943	5,655	50,598
1968	41,390	8,631	50,021
1969	58,717	14,758	73,475
1970	97,262	14,952	112,214
1971	133,075	18,412	151,487
1972	160,441	25,581	186,022
1973	134,514	33,606	168,120
1974	142,854	53,726	196,580
	Total British Preferential - Total, préférence britannique		
1961	1,846	5	1,851
1962	2,512	21	2,533
1963	1,613	43	1,656
1964	4,172	34	4,206
1965	2,718	3	2,721
1966	4,725	9	4,734
1967	5,171	26	5,197
1968	5,410	104	5,514
1969	7,097	135	7,232
1970	12,175	222	12,397
1971	8,794	2,692	11,486
1972	11,350	604	11,954
1973	14,485	3,419	17,904
1974	18,760	4,386	23,146

Year Année	Exports Exportations $'000	Re-Exports Réexportations $'000	Total Total $'000
	Total Most-Favoured-Nation - Total, nation la plus favorisée		
1961	19,206	866	20,072
1962	25,025	1,150	26,175
1963	23,554	757	24,311
1964	27,907	1,558	29,465
1965	24,341	2,022	26,363
1966	28,207	3,509	31,716
1967	39,767	5,630	45,397
1968	35,923	8,527	44,450
1969	51,618	14,623	66,241
1970	85,089	14,730	99,819
1971	124,277	15,719	139,996
1972	149,076	24,976	174,052
1973	119,962	30,166	158,128
1974	123,974	49,340	173,314
	Total General - Total, général		
1961	27	-	27
1962	16	-	16
1963	12	-	12
1964	120	-	120
1965	33	-	33
1966	*	-	*
1967	4	-	4
1968	57	-	57
1969	-	-	-
1970	-	-	-
1971	-	-	-
1972	12	-	12
1973	72	18	90
1974	122	-	122
	United Kingdom - Royaume-Uni		
1961	950	5	955
1962	1,128	2	1,130
1963	643	*	643
1964	2,119	4	2,123
1965	898	3	901
1966	4,099	9	4,108
1967	4,306	24	4,330
1968	4,662	92	4,754
1969	5,553	95	5,648
1970	9,136	175	9,311
1971	7,361	62	7,423
1972	9,321	353	9,674
1973	10,350	1,092	11,442
1974	10,860	1,609	12,469

Appendix K (Cont.)
Appendice K (Suite)

Year Année	Exports Exportations $'000	Re-Exports Réexportations $'000	Total Total $'000
	Australia - Australie		
1961	352	-	352
1962	661	3	664
1963	285	-	285
1964	566	-	566
1965	831	-	831
1966	158	-	158
1967	293	1	294
1968	227	2	229
1969	514	2	516
1970	1,432	*	1,432
1971	465	3	468
1972	566	2	568
1973	1,349	2,243	3,592
1974	3,410	2,646	6,056
	Belgium and Luxembourg - Belgique et Luxembourg		
1961	447	-	447
1962	552	1	553
1963	543	-	543
1964	657	-	657
1965	292	-	292
1966	466	-	466
1967	404	-	404
1968	231	-	231
1969	116	*	116
1970	619	-	619
1971	296	-	296
1972	70	-	70
1973	479	13	492
1974	1,012	7	1,019
	France - France		
1961	1,248	-	1,248
1962	1,791	*	1,791
1963	2,483	-	2,483
1964	2,813	-	2,813
1965	1,731	-	1,731
1966	2,034	5	2,039
1967	1,150	123	1,273
1968	1,233	6	1,239
1969	1,101	120	1,221
1970	5,551	31	5,582
1971	2,822	60	2,882
1972	2,367	26	2,393
1973	4,937	84	5,021
1974	9,018	422	9,440

Year Année	Exports Exportations $'000	Re-Exports Réexportations $'000	Total Total $'000
	Germany West - Allemagne de l'Ouest		
1961	3,732	6	3,738
1962	4,927	6	4,933
1963	4,100	-	4,100
1964	3,952	7	3,959
1965	3,219	3	3,222
1966	2,715	92	2,807
1967	1,731	12	1,743
1968	564	7	571
1969	1,611	20	1,631
1970	5,150	15	5,165
1971	1,722	46	1,768
1972	2,175	209	2,384
1973	6,983	68	7,051
1974	6,658	47	6,705
	Italy - Italie		
1961	883	1	884
1962	712	-	712
1963	936	54	990
1964	1,601	-	1,601
1965	1,214	-	1,214
1966	743	*	743
1967	688	-	688
1968	592	-	592
1969	839	4	843
1970	1,049	*	1,049
1971	1,873	7	1,880
1972	1,174	10	1,184
1973	3,517	99	3,616
1974	6,568	1,099	7,667
	The Netherlands - Pays-Bas		
1961	385	34	419
1962	257	*	257
1963	293	6	299
1964	258	-	258
1965	369	*	369
1966	170	11	181
1967	99	4	103
1968	97	*	97
1969	529	18	547
1970	1,497	3	1,500
1971	882	59	941
1972	1,188	32	1,220
1973	2,412	73	2,485
1974	2,774	26	2,800

Appendix K (Cont.)
Appendice K (Suite)

Year Année	Exports Exportations $'000	Re-Exports Réexportations $'000	Total Total $'000
	Sweden - Suède		
1961	769	-	769
1962	489	-	489
1963	606	6	612
1964	738	-	738
1965	475	-	475
1966	413	1	414
1967	393	3	396
1968	704	2	706
1969	687	1	688
1970	1,058	1	1,059
1971	501	27	528
1972	110	4	114
1973	886	5	891
1974	686	13	699
	Japan - Japon		
1961	2,510	*	2,510
1962	3,831	-	3,831
1963	3,713	-	3,713
1964	5,463	4	5,467
1965	3,218	-	3,218
1966	4,653	*	4,653
1967	7,127	352	7,479
1968	6,208	2	6,210
1969	3,873	28	3,901
1970	1,600	350	1,950
1971	642	237	879
1972	1,192	296	1,488
1973	1,291	255	1,546
1974	6,406	99	6,505
	United States of America - Etats-Unis d'Amérique		
1961	4,205	825	5,030
1962	6,564	1,142	7,706
1963	5,097	691	5,788
1964	6,819	1,497	8,316
1965	9,242	2,017	11,259
1966	12,592	3,346	15,938
1967	20,683	5,118	25,801
1968	18,381	8,484	26,865
1969	39,603	14,407	54,010
1970	64,568	14,315	78,883
1971	111,570	14,877	126,447
1972	139,236	24,121	163,357
1973	90,458	28,655	119,113
1974	72,341	44,311	116,652

Year Année	Exports Exportations $'000	Re-Exports Réexportations $'000	Total Total $'000
	Other Countries - Autres pays		
1961	5,597	-	5,597
1962	6,641	17	6,658
1963	6,480	43	6,523
1964	7,213	81	7,294
1965	5,602	2	5,604
1966	4,889	54	4,943
1967	8,069	18	8,087
1968	8,491	36	8,527
1969	4,291	63	4,354
1970	5,602	62	5,664
1971	4,941	3,034	7,975
1972	3,042	528	3,570
1973	11,852	1,019	12,871
1974	23,121	3,447	26,568

(a) Prior to 1961 included in c.c. 5625 and 9360.
a) Antérieurement à 1961 était compris dans c.m. 5625 et 9360.

Source: Statistics Canada.
Statistique Canada.